



Maeda Corporation

Expansion of Shek Wu Hui Treatment Works

Final EM&A Review Report

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# Maeda Corporation

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### Final EM&A Review Report

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Certified by Environmental Team Leader



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# EXECUTIVE SUMMARY

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This is the Final Environmental Monitoring and Audit (EM&A) Report prepared by Hyder Consulting Limited, the designated Environmental Team (ET), for the construction phase of the Project “Expansion of Shek Wu Hui Sewage Treatment Plant”. All major construction works had been substantially completed on 8 October 2008. Further to the on-site inspection conducted in January 2009 by ET, no significant environment deficiency was observed and no significant environmental impact arising from the construction works was anticipated. As such, the EM&A programme had been suspended on 5 February 2009. Upon further advised by the Contractor, all civil works of construction phase have been entirely completed in September 2009 and the outstanding works mainly include electric and mechanical (E&M) installations and testing, which are short-term and minor in nature. The overall construction phase of EM&A programme was proposed to be terminated since 1 November 2009.

This report summarizes the outcomes of the entire EM&A works undertaken from December 2005 to January 2009.

## Environmental Monitoring Works

### *Air Quality*

During construction phase, both 1-hour and 24-hour TSP monitoring works were conducted at two designated locations (CAM1a at San Po Street Pumping Station and CAM2a at Sheung Shui Heung Floodwater Pumping Station). A total of 6 Action Level exceedances and 5 Limit level exceedance of 1-hr TSP, and 2 Action Level and 5 Limit Level exceedances of 24-hour TSP were recorded. However, none of them was project-related. Those exceedances were contributed by the heavy vehicle movement along the public roads adjacent to the monitoring stations

### *Noise*

During construction phase, weekly noise monitoring was undertaken at two designated locations NM1 at Wai Loi Tsuen and NM2 at a temporary domestic structure. No exceedances of Action Level in response to noise complaints or Limit Level exceedances were recorded.

## Environmental Complaints and Prosecutions

During construction phase, no complaint, summons or successful prosecutions was received.

## Site Inspections

Weekly site inspection and monthly site audit were carried out by ET and the Independent Environmental Checker (IEC) to ensure proper implementation of environmental mitigation measures specified in the EM&A Manual and compliance with environmental legislation.

Mitigation measures had been implemented by the Contractor to minimize the environmental impacts due to construction activities. Site inspections carried out by ET and IEC showed that the Contractor rectified most of the problems promptly, indicating the EM&A program were effective in protecting the environment. As such, the environmental performance of the Contractor during the construction period was considered satisfactory.

# 1 INTRODUCTION

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## 1.1 Background

- 1.1.1 Shek Wu Hui Sewage Treatment Works (SWHSTW) was used to provide treatment to the wastewater generated from Fanling / Sheung Shui areas before discharge it into Mai Po Inner Deep Bay Ramsar Site through River Indus and Shenzhen River, thus help protecting the water quality of River Indus, Shenzhen River and Mai Po Inner Deep Bay Ramsar Site. The expansion of SWHSTW aims to expand the treatment capacity of the existing SWHSTW to cope with the increasing wastewater flows and loads as a result of the population growth in the catchment area of Fanling / Sheung Shui and the committed extension of sewerage system to unsewered areas.
- 1.1.2 In accordance with Section 9(2)(g) of the Environmental Impact Assessment Ordinance (EIAO), the SWHSTW is an exempted designated project (DP) as the existing SWHSTW has been in operation before the EIAO came into effect on 1 April 1998. However, since the proposed works involve physical expansion and alternation to existing SWHSTW (the Project) and may cause adverse environmental impacts if no appropriate mitigation measures are in place, it shall be considered as a project constituting a material change to an exempted designated project under Schedule 2 of EIAO. Therefore, the procedures under the EIAO have been followed. A Project Profile (PP) for direct application of the EP (Application No. DIP-121/2005) was approved by the Environmental Protection Department (EPD) in May 2005 and an environmental permit (EP-218/2005) was obtained prior to the commencement of the expansion works.
- 1.1.3 Maeda Corporation (Maeda) was awarded by the Drainage Services Department (DSD) with the civil contract of the Expansion of SWHSTW in September 2005. Hyder Consulting Limited (Hyder) was commissioned by Maeda as the Environmental Team (ET) during the construction period. CH2M HILL Hong Kong Limited (formerly known as CH2M-IDC Hong Kong Limited) was appointed by DSD to provide the Independent Environmental Checker (IEC) for the project. The major construction period of the Project was 38 months (i.e., from December 2005 to January 2009). The notified commencement date of work to the Director of EPD is 14 December 2005. The construction phase of the captioned project was substantially completed in October 2008. The last site audit was conducted on 21 January 2009. As there were no critical environmental deficiency observed, no project-related exceedance, no complaint and prosecutions received, the construction phase EM&A programme was suspended on 5 February 2009. All civil works of construction phase have been entirely completed in September 2009 and the overall construction phase EM&A programme was terminated since 1 November 2009.

## 1.2 Project Organization

1.2.1 The Engineer (DSD) is responsible for overseeing construction works and ensuring that they are undertaken by the Contractor (Maeda) in accordance with the specification and other contractual requirements. The Contractor shall report to the Engineer. The ET is employed by the Contractor and is responsible for conducting the EM&A programme. The IEC shall advise the Engineer on the environmental issues related to the Project.

1.2.2 The up-to-date key contacts are summarized in **Table 1-1**. The project organisation is also shown in **Appendix 1**.

Party	Position	Name	Telephone Number	Fax Number
Project Proponent – DSD	Project Manager	Mr. Ben Yip	2594 7461	2827 8700
	Engineer’s Representative	Mr. Freddie Tsang	2594 7459	2827 8700
Contractor – Maeda	Construction Engineer	Mr. H. Kakegawa	6409 9851	2724 4046
ET – Hyder	ET Leader	Mr. Antony Wong	2911 2744	2805 5028
IEC – CH2M HILL	IEC	Mr. Y.T Tang	3105 8686	2507 2293

**Table 1-1 Key Personnel Contact Names and Telephone Number for the Project**

## 1.3 Scope of Works

1.3.1 Major activities of the construction works undertaken by the Contractor during the period from December 2005 to January 2009 included the following:

▪ Ground investigation work	▪ Pipe laying
▪ Demolition of existing structure	▪ Post-drilling
▪ Set up of engineer’s site office	▪ Excavation and backfilling
▪ Construction of preliminary H-pile	▪ Loading tests for the piles
▪ Relocation and construction of bund wall of FeCl <sub>3</sub> tank	▪ Road Works
▪ Construction of chemical waste storage area	▪ Cable / utilities diversion
▪ Construction of substructure and superstructure	▪ Extraction of sheet piles
▪ Construction of Cable trench	▪ Sheet piling work
▪ Construction of manhole/chamber	▪ Water Tightness Test
▪ Construction of pile cap / pile head	▪ Remedial work for concrete structure
▪ Construction of RC wall	▪ Pipe laying
▪ Installation of chequer plates, windows and doors installation	▪ Cable Ducts and Cable Drawpits

▪ installation of waling and struts	▪ Footway Reinstatement
▪ Installation of handrailing, FRP covers, structural steelwork and perforated covers	▪ Landscaping Work
▪ Installation false ceiling	▪ Driving of sheet piles and extraction of sheet piles
▪ Extraction of sheet piles	

**Table 1-2 Major Construction Works for the Project**

## 2 EM&A REQUIREMENTS

### 2.1 Project Area, Sensitive Receivers and Monitoring Locations

2.1.1 The site is located at the existing Shek Wu Hui Sewage Treatment Works (SWHSTW) next to Chuk Wan Street. The project area, environmental sensitive receivers and monitoring locations are shown in **Appendix 2**.

#### Air Quality

2.1.2 Two designated air quality monitoring locations stipulated in EM&A manual are listed in **Table 2-1** below and shown in **Appendix 2**.

Monitoring Station	Description
CAM1a	San Po Street Pumping Station at ground floor level
CAM2a	Sheung Shui Heung Floodwater Pumping Station at ground floor level

**Table 2-1 Monitoring Locations for Air Quality Monitoring**

#### Noise

2.1.3 Two designated noise monitoring locations stipulated in EM&A manual are listed in **Table 2-2** below and shown in **Appendix 2**.

Monitoring Station	Description
NM1	Wai Loi Tsuen
NM2	Temporary Domestic Structure

**Table 2-2 Monitoring Locations for Noise Monitoring**



## 2.2 Monitoring Parameters and Methodology

2.2.1 The air quality and noise monitoring parameters and frequencies are summarized in **Table 2-3**.

Monitoring	Monitoring Station	Parameter	Frequency
Air Quality	CAM1a, CAM2a	1-hour TSP	Once every 6-day
		24-hour TSP	
Noise	NM1, NM2	L <sub>eq</sub> (30 min)	Weekly

**Table 2-3 Frequency of Air Quality and Noise Impact Monitoring**

### Air Quality

2.2.2 1-hr and 24-hr TSP monitoring works were undertaken by the ET using high volume samplers (HVSs). The sampling procedures followed the standard sampling method as set out in High Volume Method for Total Suspended Particulates, Part 50 Chapter 1 Appendix B, Title 40 of the Code of Federal Regulations of the USEPA.

2.2.3 During the sampling, dust laden air was drawn through a HVS fitted with a conditioned, pre-weighted filter paper, at a controlled rate. After sampling for 1 hour and 24 hours, the filter paper with retained particles was collected and returned to the laboratory for drying in a desiccator followed by accurate weighing. Respective 1-hour and 24-hour TSP levels were calculated from the ratio of the mass of particulates retained on the filter paper to the total volume of air sampled.

2.2.4 The HVSs were equipped with an electronic mass flow controller and calibrated against a traceable standard at regular intervals. All equipment, calibration kit and filter papers were clearly labelled.

2.2.5 The sampling procedures and specifications were the same for 1-hour and 24-hour baseline air quality monitoring except the sampling duration. The specifications were as follows:

- 0.6-1.7 m<sup>3</sup>/min (20-60SCFM);
- Equipped with a timing/control device with +/- 5 minutes accuracy for 24 hours operation;
- Installed with elapsed time meter with +/- 2 minutes accuracy for 24 hours operation;
- Capable of providing a minimum exposed area of 406 cm<sup>2</sup> (63in<sup>2</sup>);
- Flow control accuracy: +/- 2.5% deviation over 24-hr sampling period;
- Equipped with a shelter to protect the filter and sampler;
- Incorporated with an electronic mass flow rate controller or other equivalent devices;
- Equipped with a flow recorder for continuous monitoring;
- Provided with a peaked roof inlet;
- Incorporated with a manometer;
- Able to hold and seal the filter paper to the sampler housing at horizontal position;
- Easy to change the filter; and

- Capable of operating continuously for a 24-hour period.
- 2.2.6 Relevant environmental data including temperature, pressure, weather conditions, elapsed-time meter reading for the start and stop of the sampler, identification and weight of the filter paper, and other special phenomena observed and work progress of the concerned site were also recorded.
- 2.2.7 Filter papers of size 8"x10" were labelled before sampling. They were inspected clean with no pin holes and conditioned in a humidity-controlled chamber for over 24-hr and be pre-weighed before use for the sampling.
- 2.2.8 After sampling, the filter papers loaded with dust were kept in a clean and tightly sealed plastic bag, and then returned for reconditioning in the humidity controlled chamber followed by accurate weighing by an electronic balance with a readout down to 0.1 mg. All the collected samples were kept in a good condition for 6 months before disposal.
- 2.2.9 The weight of each filter paper was measured by a HOKLAS accredited laboratory.
- 2.2.10 HVS - Model GBM2000H1, manufactured by Anderson Instruments Inc., was used for TSP monitoring. It complies with the USEPA specifications in Appendix B Part 50 - Reference Method for the Determination of Suspended Particulate matter in the Atmosphere (High-Volume Method) of the Code of Federal Regulation dated July 1, 1991. Initial calibration of dust monitoring equipment was conducted upon installation and prior to commissioning. One point flow rate calibration would be carried out every two months. Five-point calibration would be carried out every six months. All the calibration data were converted into standard temperature and pressure condition. Orific HVS Calibration Kit Serial No: 517N was used for the calibration of HVSs. Calibration of calibration kit was carried out annually.

## Noise

- 2.2.11 The construction noise level was measured in terms of the A-weighted equivalent continuous sound pressure level ( $L_{eq}$ ) for 30 minutes.  $L_{eq(30\text{ min})}$  was used as the monitoring parameter for the period between 0700 and 1900 hours on normal weekdays. Other noise parameters such as  $L_{10}$  and  $L_{90}$  should also be obtained for reference.
- 2.2.12 Weatherproof logging sound level meters which comply with the International Electrotechnical Commission Publication 651: 1979 (Type 1) and 804: 1985 (Type 1) specifications were used to continuously measure the construction noise at the designated monitoring locations. Noise parameters of the A-weighted levels  $L_{eq}$ ,  $L_{10}$  and  $L_{90}$  were measured with a sampling period of 5 minutes throughout the monitoring. The average of six consecutive 5-minute readings was used to provide  $L_{eq(30\text{ minutes})}$  for non restricted hours. A facade correction of 3dB(A) would be applied to all free field measurements.
- 2.2.13 During the impact monitoring, information such as date, weather condition, equipment used, measurement results and major noise sources were recorded on the field data record sheet. No noise measurements were made in fog, rain, wind with a steady speed exceeding 5 m/s or wind with gusts exceeding 10 m/s. The wind speeds were checked with a portable wind speed meter capable of measuring wind speed in m/s. All noise measurements were recorded to the nearest 0.1dB(A).
- 2.2.14 For noise monitoring, Bruel & Kjaer (B&K) Precision Integrating Sound Level Meters of Type 2238 in compliance with the International Electrotechnical Commission Publication 651: 1979 (Type 1) and 804: 1985 (Type 1) Specifications were used.

2.2.15 Prior to and following each noise measurement, the accuracy of the sound level meter was checked using an acoustic calibrator (B&K Type 4231) generating a known sound pressure level at a known frequency. Measurements were considered as valid only if the calibration level from before and after the noise measurement agree to within 1.0dB. All sound level meters and calibrators were calibrated annually.

## 2.3 Performance Limits

### Air Quality

2.3.1 The Action and Limit (A/L) Levels were defined in accordance with the baseline monitoring results documented in the Baseline Monitoring Report for the Project (Hyder's ref.: EA01284R0012). **Table 2-4** shows the A/L Levels for the Project. The Event / Action Plan summarised in **Table 2-6** had been taken for the exceedances of A/L limits which were confirmed as project-related.

Monitoring Station ID	1-hour TSP Level in $\mu\text{g}/\text{m}^3$		24-hour TSP Level in $\mu\text{g}/\text{m}^3$	
	Action Level	Limit Level	Action Level	Limit Level
CAM1a	342.7	500	203.3	260
CAM2a	340.2		201.6	

**Table 2-4 Action and Limit Levels for Air Quality Monitoring**

### Noise

2.3.2 The Action and Limit Levels for construction noise are tabulated in **Table 2-5**. The Event / Action Plan summarised in **Table 2-7** had been taken for the exceedances of A/L limits which were confirmed as project-related.

Time Period	Action Level	Limit Level
0700 – 1900 hours on normal weekdays	When one documented complaint is received	75dB(A)

**Table 2-5 Action and Limit Levels for Noise Monitoring**

## 2.4 Environmental Mitigation Measures

Relevant mitigation measures as recommended in the PP had been stipulated in the EM&A Manual for the Contractor to adopt. A list of mitigation measures is given in **Appendix 3**.

EVENT	ACTION			
	ET	IEC	ER	CONTRACTOR
<b>ACTION LEVEL</b>				
Exceedance for one sample	<ul style="list-style-type: none"> <li>Identify source, investigate the causes of exceedance and propose remedial measures;</li> <li>Inform IEC and ER;</li> <li>Repeat measurement to confirm finding.</li> </ul>	<ul style="list-style-type: none"> <li>Check monitoring data submitted by ET;</li> <li>Check Contractor's working method.</li> </ul>	<ul style="list-style-type: none"> <li>Notify Contractor.</li> </ul>	<ul style="list-style-type: none"> <li>Rectify any unacceptable practice;</li> <li>Amend working methods if appropriate.</li> </ul>
Exceedance for two or more consecutive samples	<ul style="list-style-type: none"> <li>Identify source, investigate the cause of exceedance and propose remedial measures;</li> <li>Inform IEC and ER;</li> <li>Advise ER on the effectiveness of the proposed remedial measures;</li> <li>Repeat measurements to confirm findings;</li> <li>Increase monitoring frequency to daily;</li> <li>Discuss with IEC and Contractor on remedial actions required;</li> <li>If exceedance continues, arrange meeting with IEC and ER;</li> <li>If exceedance stops, cease additional monitoring.</li> </ul>	<ul style="list-style-type: none"> <li>Check monitoring data submitted by ET;</li> <li>Check Contractor's working method;</li> <li>Discuss with ET and Contractor on possible remedial measures;</li> <li>Advise the ET on the effectiveness of the proposed remedial measures;</li> <li>Supervise Implementation of remedial measures.</li> </ul>	<ul style="list-style-type: none"> <li>Confirm receipt of notification of exceedance in writing;</li> <li>Notify Contractor;</li> <li>Ensure remedial measures properly implemented.</li> </ul>	<ul style="list-style-type: none"> <li>Submit proposals for remedial to ER within 3 working days of notification;</li> <li>Implement the agreed proposals;</li> <li>Amend proposal if appropriate.</li> </ul>
<b>LIMIT LEVEL</b>				
Exceedance for one sample	<ul style="list-style-type: none"> <li>Identify source, investigate the causes of exceedance and propose remedial measures;</li> <li>Inform IEC, ER, Contractor and EPD;</li> </ul>	<ul style="list-style-type: none"> <li>Check monitoring data submitted by ET;</li> <li>Check Contractor's working method;</li> </ul>	<ul style="list-style-type: none"> <li>Confirm receipt of notification of exceedance in writing;</li> <li>Notify Contractor;</li> <li>Ensure remedial measures</li> </ul>	<ul style="list-style-type: none"> <li>Take immediate action to avoid further exceedance;</li> <li>Submit proposals for remedial actions to IEC within 3 working</li> </ul>

EVENT	ACTION			
	ET	IEC	ER	CONTRACTOR
	<ul style="list-style-type: none"> <li>Repeat measurement to confirm finding;</li> <li>Increase monitoring frequency to daily;</li> <li>Assess effectiveness of Contractor’s remedial actions and keep IEC, EPD and ER informed of the results.</li> <li>If exceedance stops, cease additional monitoring.</li> </ul>	<ul style="list-style-type: none"> <li>Discuss with ET and Contractor on possible remedial measures;</li> <li>Advise ER on the effectiveness of the proposed remedial measures;</li> <li>Supervise implementation of remedial measures.</li> </ul>	properly implemented.	<ul style="list-style-type: none"> <li>days of notification;</li> <li>Implement the agreed proposals;</li> <li>Amend proposal if appropriate.</li> </ul>
Exceedance for two or more consecutive samples	<ul style="list-style-type: none"> <li>Notify IEC, ER, Contractor and EPD;</li> <li>Identify source, investigate the cause of exceedance and propose remedial measures;</li> <li>Repeat measurement to confirm findings;</li> <li>Increase monitoring frequency to daily;</li> <li>Carry out analysis of Contractor’s working procedures to determine possible mitigation to be implemented;</li> <li>Arrange meeting with IEC and ER to discuss the remedial actions to be taken;</li> <li>Assess effectiveness of Contractor’s remedial actions and keep IEC, EPD and ER informed of the results;</li> <li>If exceedance stops, cease additional monitoring.</li> </ul>	<ul style="list-style-type: none"> <li>Discuss amongst ER, ET, and Contractor on the potential remedial actions;</li> <li>Review Contractor’s remedial actions whenever necessary to assure their effectiveness and advise ER accordingly;</li> <li>Supervise the implementation of remedial measures.</li> </ul>	<ul style="list-style-type: none"> <li>Confirm receipt of notification of exceedance in writing;</li> <li>Notify Contractor;</li> <li>In consultation with the IEC, agree with the Contractor on the remedial measures to be implemented;</li> <li>Ensure remedial measures properly implemented;</li> <li>If exceedance continues, consider what portion of the work is responsible and instruct the Contractor to stop that portion of work until the exceedance is abated.</li> </ul>	<ul style="list-style-type: none"> <li>Take immediate action to avoid further exceedance;</li> <li>Submit proposals for remedial actions to IEC within 3 working days of notification;</li> <li>Implement the agreed proposals;</li> <li>Resubmit proposals if problem still not under control;</li> <li>Stop the relevant portion of works as determined by ER until the exceedance is abated.</li> </ul>

**Table 2-6 Event / Action Plan for Air Monitoring**

EVENT	Action			
	ET	IEC	ER	CONTRACTOR
Action Level	<ul style="list-style-type: none"> <li>Notify IEC and ER;</li> <li>Carry out investigation;</li> <li>Report the results of investigation to the IEC, ER and Contractors;</li> <li>Discuss with the Contractor and formulate remedial measures;</li> <li>Increase monitoring frequency to check mitigation effectiveness.</li> </ul>	<ul style="list-style-type: none"> <li>Review the analysed results submitted by the ET;</li> <li>Review the proposed remedial measures by the Contractor and advise the ER accordingly;</li> <li>Supervise the implementation of remedial measure.</li> </ul>	<ul style="list-style-type: none"> <li>Confirm receipt of notification of failure in writing;</li> <li>Notify Contractor;</li> <li>Require Contractor to propose remedial measures for the analysed noise problem;</li> <li>Ensure remedial measures are properly implemented.</li> </ul>	<ul style="list-style-type: none"> <li>Submit noise mitigation proposal to IEC;</li> <li>Implement noise mitigation proposals.</li> </ul>
Limit Level	<ul style="list-style-type: none"> <li>Identify source;</li> <li>Inform IEC, ER, EPD and Contractor;</li> <li>Repeat measurements to confirm findings;</li> <li>Increase monitoring frequency to check mitigation effectiveness;</li> <li>Carry out analysis of Contractor's working procedures to determine possible mitigation to be implemented;</li> <li>Inform IEC, ER and EPD the causes and actions taken for the exceedances;</li> <li>Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and ER informed of the results;</li> <li>If exceedance stops, cease additional monitoring.</li> </ul>	<ul style="list-style-type: none"> <li>Discuss amongst ER, ET, and Contractor on the potential remedial actions;</li> <li>Review Contractors remedial actions whenever necessary to assure their effectiveness and advise the ER accordingly;</li> <li>Supervise the implementation of remedial measures.</li> </ul>	<ul style="list-style-type: none"> <li>Confirm receipt of notification of failure in writing;</li> <li>Notify Contractor;</li> <li>Require Contractor to propose remedial measures for the analysed noise problem;</li> <li>Ensure remedial measures properly implemented;</li> <li>If exceedance continues, consider what portion of the work is responsible and instruct the Contractor to stop that portion of work until the exceedance is abated.</li> </ul>	<ul style="list-style-type: none"> <li>Take immediate action to avoid further exceedance;</li> <li>Submit proposals for remedial actions to IEC within 3 working days of notification;</li> <li>Implement the agreed proposals;</li> <li>Resubmit proposals if problem still not under control;</li> <li>Stop the relevant portion of works as determined by the ER until the exceedance is abated.</li> </ul>

**Table 2-7 Event / Action Plan for Noise Monitoring**

### 3 MONITORING RESULTS

3.1.1 The environmental monitoring for the Project is summarized in **Table 3-1**.

Environmental Monitoring	Total No. of Measurement	
<b>1-hour TSP</b>	CAM1a	600
	CAM2a	600
<b>24-hour TSP</b>	CAM1a	200*
	CAM2a	201
<b>Noise</b>	NM1	165
	NM2	165

\*Note: There was a missing 24-hr TSP monitoring at CAM1a because of power failure of the HVS on 13 June 2008.

**Table 3-1** Number of monitoring sessions

#### Air Quality

3.1.2 Graphical presentations of both 1-hour TSP and 24-hour TSP monitoring results during the course of the Construction Phase are provided in Appendix 4. Due to the adverse weather conditions in June 2008 and a mechanical failure of the HVAS at monitoring station CAM1a on 13 June 2008 one of the data for 24-hour TSP monitoring at CAM1a could not be obtained at the monitoring stations.

3.1.3 For the entire Construction Phase, 6 Action level exceedances and 5 Limit level exceedances were recorded for 1-hour TSP monitoring. For 24-hour TSP monitoring, a total of 2 Action level and 5 Limit level exceedances were recorded. The detailed investigations for the exceedances are described in **Section 4**.

#### Noise

3.1.4 Graphical presentations of weekly noise monitoring during the Construction Phase are provided in **Appendix 5**.

3.1.5 Noise sources from the construction activities mainly included piling and the use of Powered Mechanical Equipment. Other major noise sources included vehicles moving close to the monitoring stations and construction works adjacent to project site.

## 4 NON-COMPLIANCES (EXCEEDANCES) OF THE ENVIRONMENTAL QUALITY PERFORMANCE LIMITS

### 4.1 Summary of Exceedances and Action Taken

#### Air Quality

- 4.1.1 For the entire Construction Phase, 6 Action level exceedances and 5 Limit level exceedances were recorded for 1-hour TSP monitoring. For 24-hour TSP monitoring, a total of 2 Action level and 5 Limit level exceedances were recorded. **Table 4-1** summarizes the number of air quality exceedances.

Monitoring stations	1-hour Monitoring No. of Exceedance		24-hour Monitoring No. of Exceedance	
	Action Level	Limit Level	Action Level	Limit Level
CAM1a	2	4	1	3
CAM2a	4	1	1	2
<b>Total</b>	<b>6</b>	<b>5</b>	<b>2</b>	<b>5</b>

**Table 4-1 Summary of Air Quality Exceedances**

- 4.1.2 For the Action and Limit Level TSP exceedances recorded during the Construction Phase of the Project, activities carried out on the day of exceedances were reviewed. No particular dust generating construction activities of the Project were undertaken upon monitoring and mitigation measures for the construction dust such as regular watering had been carried out by the contractor. In accordance with ET's investigations, the exceedances were mainly due to the dust generated by heavy vehicles movement along the public roads adjacent to the monitoring stations and the construction activities at nearby construction site. **Table 4-2** and **Table 4-3** shows action and investigation taken of 1-hr and 24-hr TSP exceedances and their implications respectively.
- 4.1.3 Site investigation and relevant rectification had been carried out for all exceedances. The required mitigation measures in the Event-Action Plans had been implemented.
- 4.1.4 Although the exceedances in TSP were considered not mainly related to construction activities of this Project, the Contractor was still reminded to provide watering on the unpaved haul road and work areas to minimize dust generation. Subsequent TSP monitoring as scheduled or ad-hoc TSP monitoring was carried out after exceedance was observed and showed no continuation of the exceedances. Follow up action was taken to ensure the environmental quality performance was acceptable.



Date of Exceedance	Action / Limit Level Exceedances	Action Taken
<b>1-hr TSP exceedances at monitoring station CAM1a</b>		
18 July 2006	2 Limit Level Exceedances	<ol style="list-style-type: none"> <li>1 <b>Identify source, investigate the causes of exceedance and propose remedial measures</b> – the exceedances were likely due to the concrete breaking activities, which is a dust generating activity, for the pumping station where is about 3m from the monitoring station. Since it was undertaken by other project and no exceedance was recorded in the subsequent monitoring when no concrete breaking activity was being undertaken, these exceedances were considered invalid.</li> <li>2 <b>Inform IEC, ER and EPD</b> – IEC, ER and EPD were informed</li> <li>3 <b>Repeat measurement to confirm finding</b> – No repeat measurement was carried out because the exceedances were not project-related</li> <li>4 <b>Increase monitoring Frequency to daily</b> – N/A</li> </ol>
6 February 2007	2 Limit Level Exceedances and 1 Action Level Exceedances	<ol style="list-style-type: none"> <li>1 <b>Identify source, investigate the causes of exceedance and propose remedial measures</b> – The exceedances were likely to be caused by the construction activities from the metal cutting and E&amp;M installation works nearby. Some vehicles were observed moving in and out of the pumping station. No exceedance was recorded in the results of the subsequent 1-hr and 24-hr TSP monitoring conducted on 12 February 2007, these exceedances were considered invalid</li> <li>2 <b>Inform IEC, ER and EPD</b> – IEC, ER and EPD were informed</li> <li>3 <b>Repeat measurement to confirm finding</b> – Results of the subsequent 1-hr and 24-hr TSP monitoring conducted on 12 February 2007 showed full compliance of Action and Limit Levels.</li> <li>4 <b>Increase monitoring Frequency to daily</b> – N/A</li> </ol>
29 October 2008	1 Action Limit Exceedance	<ol style="list-style-type: none"> <li>1 <b>Identify source, investigate the causes of exceedance and propose remedial measures</b> – The ET has concluded that the source of dust was from traffic on San Po Street and not related to the project.</li> <li>2 <b>Inform IEC and ER</b> – the IEC and ER were informed.</li> <li>3 <b>Repeat measurement to confirm finding</b> – Subsequent reading was taken immediately after the exceedance and showed no continuation of the exceedances</li> <li>4 <b>Increase monitoring Frequency to daily</b> – N/A</li> </ol>

Date of Exceedance	Action / Limit Level Exceedances	Action Taken
<b>1-hr TSP exceedances at monitoring station CAM2a</b>		
29 February 2008	1 Limit Level Exceedances	<ol style="list-style-type: none"> <li><b>1 Identify source, investigate the causes of exceedance and propose remedial measures</b> – During the monitoring works on that day, no dusty construction works of the project were observed. Soil handling works were being undertaken for the planter construction at the pumping station nearby the monitoring station. It is considered that the exceedances were not related to the construction works of the project.</li> <li><b>2 Inform IEC, ER and EPD</b> – the IEC, ER and EPD were informed.</li> <li><b>3 Repeat measurement to confirm finding</b> – Subsequent reading was taken immediately after the exceedance and showed no continuation of the exceedance</li> <li><b>4 Increase monitoring Frequency to daily</b> – N/A</li> </ol>
6 March 2008	1 Action Level Exceedance	<ol style="list-style-type: none"> <li><b>1 Identify source, investigate the causes of exceedance and propose remedial measures</b> – No dust generating works related to the Project were observed in the vicinity of the monitoring stations. During the site inspection on 19 March 2007, open stockpiles without full covering were observed at no. 7 sedimentation tank and bioreactor. This could be a cause of the non-project related exceedance. It was observed that a planter is being constructed adjacent to the monitoring station. Also, no other exceedances were recorded at the monitoring stations prior to or after these exceedances. It is therefore not considered as a project-related project.</li> </ol>
26 March 2008	1 Action Level Exceedance	<ol style="list-style-type: none"> <li><b>2 Inform IEC and ER</b> – the IEC and ER were informed.</li> <li><b>3 Repeat measurement to confirm finding</b> – No repeat measurement was carried out because the exceedances were not project-related.</li> <li><b>4 Increase monitoring Frequency to daily</b> – N/A</li> </ol>
13 June 2008	1 Action Level Exceedance	<ol style="list-style-type: none"> <li><b>1 Identify source, investigate the causes of exceedance and propose remedial measures</b> – It was observed that construction activities by China Light Power (CLP) were ongoing close to the monitoring station at the same time as the exceedance was recorded. These works included cable laying with sporadic opening of a trench, which is a potential dust generating operation. It is considered that the exceedance was caused by nearby offsite construction activities and not by activities carried out under this contract.</li> <li><b>2 Inform IEC and ER</b> – the IEC and ER were informed.</li> <li><b>3 Repeat measurement to confirm finding</b> – No repeat measurement was carried out as consecutive monitoring had already been carried out under the scheduled program.</li> </ol>

Date of Exceedance	Action / Limit Level Exceedances	Action Taken
<b>4 Increase monitoring Frequency to daily – N/A</b>		
24 December 2008	1 Action Level Exceedance	<p><b>1 Identify source, investigate the causes of exceedance and propose remedial measures</b> – the ET has concluded that the source of dust was from traffic on Po Wan Road and not related to the project</p> <p><b>2 Inform IEC and ER</b> – the IEC and ER were informed.</p> <p><b>3 Repeat measurement to confirm finding</b> – a subsequent measurement was taken immediately after the exceedance and showed no continuation of the exceedance</p> <p><b>4 Increase monitoring Frequency to daily – N/A</b></p>

**Table 4-2**      **Review of 1-hr TSP exceedances at both monitoring stations**

Date of Exceedance	Action / Limit Level Exceedances	Action Taken
<b>24-hr TSP exceedances at monitoring station CAM1a</b>		
6 July 2006	1 Limit Level Exceedance	<p><b>1 Identify source, investigate the causes of exceedance and propose remedial measures</b> – The exceedances were likely due to the concrete breaking activities, which is a dust generating activity, for the pumping station where is about 3m from the monitoring station. Since it was undertaken by other project and no exceedance was recorded in the subsequent monitoring when no concrete breaking activity was being undertaken, these exceedances were considered invalid.</p> <p><b>2 Inform IEC, ER and EPD</b> – the IEC, ER and EPD were informed</p> <p><b>3 Repeat measurement to confirm finding</b> – No repeat measurement was carried out because the exceedances were not project-related</p> <p><b>4 Increase monitoring Frequency to daily</b> – N/A</p>
25 January 2007	1 Action Level Exceedance	<p><b>1 Identify source, investigate the causes of exceedance and propose remedial measures</b> - Construction activity undertaken by the Contractor between 25 and 26 January 2007 included substructure construction, waling, struts cutting, superstructure construction, pile cap construction and backfilling works. As advised by the Contractor, pile cap construction and backfilling undertaken at the construction area close to CAM1a. However, these construction activities are of small scale in nature and unlikely to generate fugitive dust. Another DSD's contractor commenced the paving works of granite blocks adjacent to CAM1a at the end of January. However, as the DSD's contractor was informed of the dates of air quality monitoring, no dust generating activities were undertaken during the monitoring. The monitoring results obtained on 25 January 2007 at both monitoring locations, CAM1a and CAM2a, are high. The incidence of the Action Level exceedance for 24-hr TSP monitoring is likely a natural variation. In addition, our monitoring team observed that there were lots of heavy vehicles traveling in and out of the warehouses nearby which are the potential emission sources of particulates causing the Action Level exceedance.</p> <p><b>2 Inform IEC and ER</b> – the IEC and ER were informed</p> <p><b>3 Repeat measurement to confirm finding</b> – No repeat measurement was carried out because the exceedances were not project-related</p> <p><b>4 Increase monitoring Frequency to daily</b> – N/A</p>

Date of Exceedance	Action / Limit Level Exceedances	Action Taken
6 February 2007	1 Limit Level Exceedance	<p><b>1 Identify source, investigate the causes of exceedance and propose remedial measures</b> – The exceedances were likely to be caused by the construction activities from the metal cutting and E&amp;M installation works nearby. Some vehicles were observed moving in and out of the pumping station. The Exceedances are regarded as invalid. Results of the subsequent 1-hr and 24-hr TSP monitoring conducted on 12 February 2007 showed full compliance of Action and Limit Levels.</p> <p><b>2 Inform IEC, ER and EPD</b> – IEC, ER and EPD were informed</p> <p><b>3 Repeat measurement to confirm finding</b> – No repeat measurement was carried out because the exceedances were not project-related</p> <p><b>4 Increase monitoring Frequency to daily</b> – N/A</p>
27 November 2008	1 Limit Level Exceedance	<p><b>1 Identify source, investigate the causes of exceedance and propose remedial measures</b> – the ET has concluded that the source of dust was from traffic on San Po Road and not related to the project.</p> <p><b>2 Inform IEC, ER and EPD</b> – the IEC, ER and EPD were informed.</p> <p><b>3 Repeat measurement to confirm finding</b> – a repeat measurement was taken on 3 December 2008 and the finding will be confirmed upon the laboratory results was received.</p> <p><b>4 Increase monitoring frequency to daily</b> – monitoring frequency will be increased to daily until the exceedance stops.</p>
<b>24-hr TSP exceedances at monitoring station CAM2a</b>		
29 February 2008	1 Limit Level Exceedance	<p><b>1 Identify source, investigate the causes of exceedance and propose remedial measures</b> – During the monitoring works on that day, no dusty construction works of the project were observed. Soil handling works were being undertaken for the planter construction at the pumping station nearby the monitoring station. It is considered that the exceedances were not related to the construction works of the project.</p> <p><b>2 Inform IEC and ER</b> – the IEC and ER were informed.</p> <p><b>3 Repeat measurement to confirm finding</b> – subsequent reading was taken immediately after the exceedance and showed no continuation of the exceedance</p> <p><b>4 Increase monitoring Frequency to daily</b> – N/A</p>
18 March 2008	1 Limit Level Exceedance	<p><b>1 Identify source, investigate the causes of exceedance and propose remedial measures</b> – No dust generating works related to the Project were observed in the vicinity of the monitoring stations. During the site inspection on 19</p>

Date of Exceedance	Action / Limit Level Exceedances	Action Taken
		<p>March 2007, open stockpiles without full covering were observed at no. 7 sedimentation tank and bioreactor. This could be a cause of the non-project related exceedance. It was observed that a planter is being constructed adjacent to the monitoring station. Also, no other exceedances were recorded at the monitoring stations prior to or after these exceedances. It is therefore not considered as a project-related project.</p> <p><b>2 Inform IEC, ER and EPD</b> – the IEC, ER and EPD were informed.</p> <p><b>3 Repeat measurement to confirm finding</b> –No repeat measurement was carried out because the exceedances were not project-related.</p> <p><b>4 Increase monitoring Frequency to daily</b> – N/A</p>
27 November 2008	1 Action Level Exceedance	<p><b>1 Identify source, investigate the causes of exceedance and propose remedial measures</b> – the ET has concluded that the source of dust was from traffic on San Po Road and not related to the project.</p> <p><b>2 Inform IEC and ER</b> – the IEC and ER were informed.</p> <p><b>3 Repeat measurement to confirm finding</b> – a repeat measurement was taken on 3 December 2008 and showed no continuation of the exceedance</p> <p><b>4 Increase monitoring frequency to daily</b> – N/A.</p>

Table 4-3 Review of 24-hr TSP exceedances at both monitoring stations

## Noise

- 4.1.5 No exceedance of Action or Limit level for noise monitoring was recorded for the Construction Phase. As such, no follow-up action was required.

# 5 SITE INSPECTION

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## 5.1 Implementation Status of Environmental Mitigation Measures

- 5.1.1 The Contractor had implemented mitigation measure to minimize the environmental impacts caused by construction activities. Regarding some observations of environmental deficiencies were noted during ET's site inspections, the Contractor rectified all these problems following the recommendation provided by the ET and all the environmental deficiency items were closed.
- 5.1.2 The implementation status of environmental mitigation measures is given in **Appendix 3**

## 5.2 Environmental Licensing and Permitting

- 5.2.1 Environmental licenses and permits including Environmental Permit (EP-218/2005) for the Project and Effluent Discharge License (W5/11287/1) were in place and valid during the Construction Phase. Summary of Environmental Licensing and Permit was shown in **Table 5-2**.

## 5.3 Advice on Solid and Liquid Waste Management Status

- 5.3.1 The solid waste generated from the Project included inert and non-inert construction and demolition (C&D) waste, chemical waste (waste lubricating oil) and general refuse. Sorting and recycling of materials had been undertaken at the site. **Table 5-1** summarizes the actual waste amount generated throughout the construction period. Yearly waste flow table was provided in **Appendix 6**.

Waste Type	Total quantity generated
Inert C&D materials	~ 43 m <sup>3</sup>
General Refuse	2,260 m <sup>3</sup>
Chemical Waste	20 kg

**Table 5-1 Actual Waste Generation throughout the Construction Period**

- 5.3.2 C&D materials were disposed of at Tuen Mun Area 38 Fill Bank. General refuse was collected and disposed of at NENT Landfill properly.

Permit/Licence	Ref. No.	Valid Period		Details
		From	To	
Environmental Permit	EP-218/2005	16/06/06	End of Project	The permit is granted to Drainage Services Department for the Expansion of Shek Wu Hui Sewage Treatment Works, located at Chuk Wan Street, Shek Wu Hui.
Registration as a chemical waste producer	WPN: 5213-624-M2446-06	04/11/05	End of Project	NA
Effluent Discharge Licence	W5/11287/1	20/05/05	19 Dec 2010	The licence was granted under WPCO Deep Bay Water Control Zone for the construction site at extension work of Shek Wu Hui Sewage Treatment Works at Chuk Wan Street, Sheung Shui, N.T.
Application for Exemption Account for Disposal of Construction Waste	RN/00134	31 Dec 2005	23 Dec 2009	NA
Construction Noise Permit	GW-RN0272-06	1 Jun 2006	30 Nov 2006	For lists of PMEs between 0700 and 2300 on general holidays and between 1900 and 0700 on any day not being a general holiday
	GW-RN0469-06	18 Sep 2006	10 Oct 2006	For lists of PMEs between 1900 and 2130 on any day not being a general holiday
	GW-RN0574-06	1-Dec-06	31-May-07	For lists of PMEs between 0700 and 0700 on general holidays and between 1900 and 0700 on any day not being a general holiday
	GW-RN0224-07	1-Jun-07	30-Nov-07	For lists of PMEs between 0000 and 2400 on general holidays (including Sundays) and between 0000 to 0700 and 1900 to 2400 on any day not being a general holiday
	GW-RN0507-07	1-Dec-07	31-May-08	For lists of PMEs between 0000 and 2400 on general holidays (including Sundays) and between 0000 to 0700 and 1900 to 2400 on any day not being a general holiday

Note: NA = Not Available

**Table 5-2 Summary of Environmental Permits and Licenses**



## 6 SUMMARY OF COMPLAINT, NOTIFICATION OF SUMMONS AND SUCCESSFUL PROSECUTIONS

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### 6.1 Complaint Record

- 6.1.1 In case of an environmental complaint received, all related parties should follow the complaints response procedures specified in the EM&A Manual.
- 6.1.2 During the construction phase, no environmental complaint was received.

### 6.2 Summary of Notification of Summons, Successful Prosecutions

- 6.2.1 No summons and successful prosecution was received throughout the construction phase.

## 7 COMPARISON OF EM&A DATA WITH PP PREDICTION

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### 7.1 1-hour TSP and 24-hour TSP Monitoring

- 7.1.1 Except a few numbers of exceedances recorded because of non-project construction works at nearby construction site and vehicles movement along the road adjacent to the monitoring stations, environmental monitoring data collected during the construction period were generally well below the prediction of mitigated scenario in the Project Profile (PP) for Expansion of Shek Wu Hui Sewage Treatment Works so the monitoring results were within the acceptable levels as stipulated in PP.

### 7.2 Noise Monitoring

- 7.2.1 The environmental monitoring data collected during the construction period were generally well below the prediction of mitigated scenario in the Project Profile (PP).

## 7.3 Review of Effectiveness and Efficiency of the Mitigation Measures

7.3.1 The Contractor generally implemented all the mitigation measures recommended in the PP and stipulated in the EM&A Manual to suppress the environmental impacts. All mitigation measures were applicable to the Project. The environmental monitoring results indicated that the construction activities in general were in compliance with the relevant environment requirements and were environmentally acceptable. The effectiveness and efficiency of the mitigation measures were high as evidenced by rare exceedances and no complaint recorded and the mitigation measures implemented were effective and efficient in controlling environmental impacts.

## 7.4 Review of Environmental Monitoring Methodology and EM&A Programme

7.4.1 The environmental monitoring methodologies and procedures were regularly reviewed by the ET. No modification to the existing monitoring methodology was made during the construction period. Monitoring and audit of 1-hour TSP, 24-hour TSP and noise ensured that any deterioration in environmental condition was readily detected and timely actions taken to rectify any non-compliance. Since no project-related exceedance was concluded, and the monitoring results were in general same as the predictions with mitigation measures in the PP, the EM&A programme was considered successfully conducted during the Construction Phase of the Project. Therefore the monitoring methodology of the EM&A Programme was considered effective and cost-effective.

## 7.5 Environmental Acceptability of the Project

7.5.1 Throughout the construction phase of the Project, 18 exceedances of air quality and none for noise level were reported, and all of them were concluded not related to the Project's construction works. This indicated that the construction activities in general complied with the relevant environmental requirement and were environmentally acceptable.

## 7.6 Recommendation of Improvement in the EM&A Programme

7.6.1 The EM&A Programme was smooth and successful as evident by the small number of exceedances and no complaint. No modification to the EM&A Program is considered necessary.

## 8 Conclusion

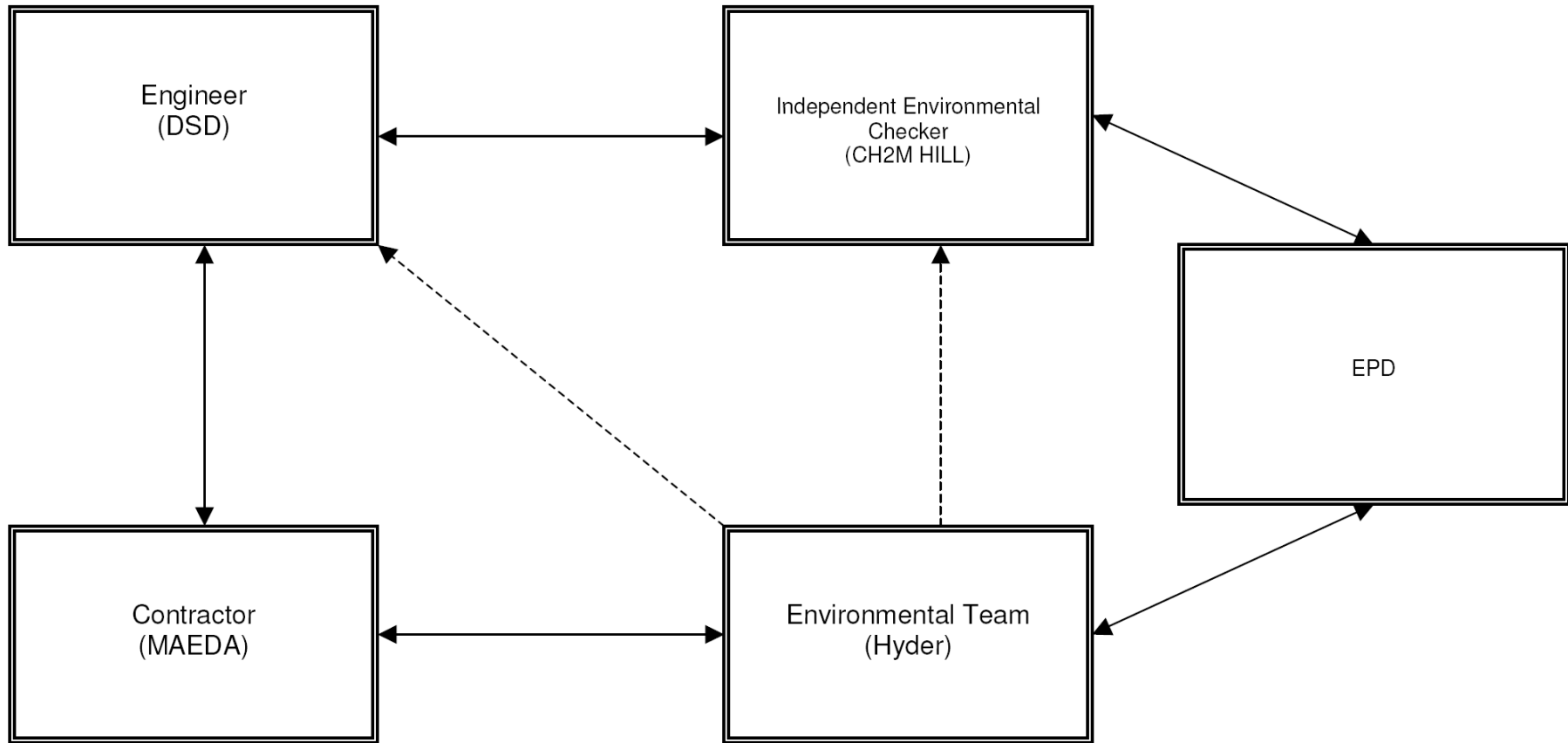
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- 8.1.1 The construction phase of the captioned project was substantially completed in October 2008. The last site audit was conducted on 21 January 2009. As there were no critical environmental deficiency observed, no project-related exceedance, no complaint and prosecutions received, the construction phase EM&A programme was suspended on 5 February 2009. All civil works of construction phase have been entirely completed in September 2009 and the overall construction phase EM&A programme was terminated since November 2009.
- 8.1.2 Air quality and noise monitoring had been undertaken during the construction period in accordance with the contract specific EM&A Manual. There were 2 monitoring stations for air quality and noise monitoring. During the course of the project, a total of 6 Action Level exceedances and 5 Limit level exceedance of 1-hr TSP, and 2 Action Level and 5 Limit Level exceedances of 24-hour TSP were recorded. Yet all of these exceedances were non-project related. For noise, no exceedance of Action Level or Limit Level was recorded.
- 8.1.3 No complaint, notifications of summons or prosecutions were received and made successfully, respectively.
- 8.1.4 Weekly site inspections and monthly site audits were carried out by ET and the Independent Environmental Checker (IEC), respectively, to ensure proper implementation of environmental mitigation measures specified in the EM&A Manual and compliance with environmental legislation. All observations, which were recorded on the inspection checklist, were passed to the Contractor together with the ET's recommendations.
- 8.1.5 Mitigation measures had been implemented by the Contractor to minimize the environmental impacts due to construction activities. Site inspections carried out by ET showed that the Contractor rectified the problems observed and no major environmental deficiency was induced. The environmental performance of the Contractor during the construction period was considered satisfactory.
- 8.1.6 The monitoring results of non-compliance indicated that the recommended mitigation and EM&A programme were effective for protection of the environment and there was no unacceptable environmental impact posed by the construction of the Project.
- 8.1.7 Upon completion of the project, environmental qualities returned to the ambient levels. No significant impact to the adjacent environment was noted, which concurs with the PP findings.

Appendix 1

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Organization Chart



←————→ Line of Communication

-----> Line of Reporting



Title

**Expansion of Shuk Wu Hui Sewage Treatment Works**

Date

December 2005

**Project Organization**

Appendix 1

## Appendix 2

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# Project Area, Environmental Sensitive Receivers and Monitoring Locations



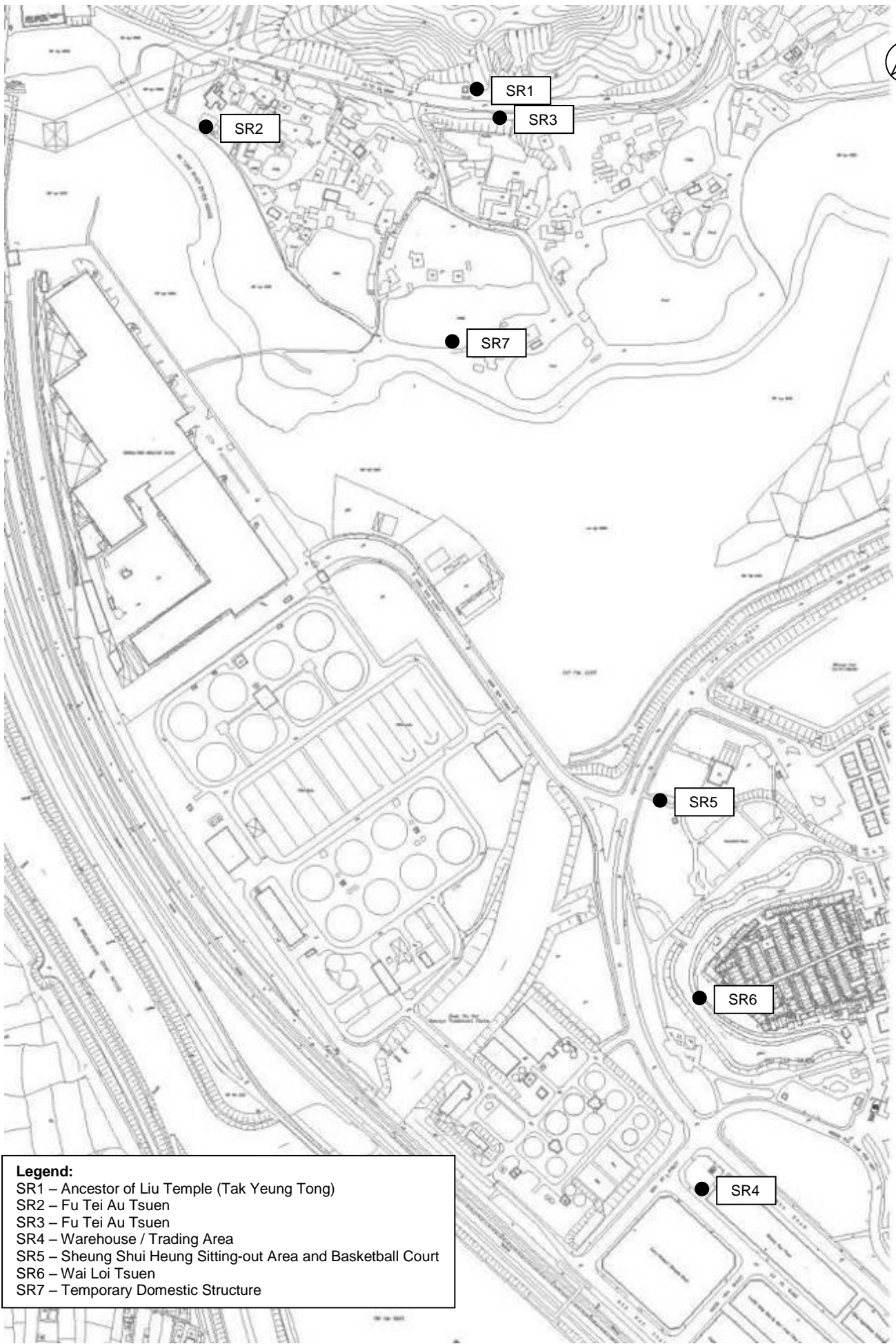
Title

**Expansion of Shuk Wu Hui Sewage Treatment Works**

**Project Area**

Appendix 2-a





**Legend:**  
SR1 – Ancestor of Liu Temple (Tak Yeung Tong)  
SR2 – Fu Tei Au Tsuen  
SR3 – Fu Tei Au Tsuen  
SR4 – Warehouse / Trading Area  
SR5 – Sheung Shui Heung Sitting-out Area and Basketball Court  
SR6 – Wai Loi Tsuen  
SR7 – Temporary Domestic Structure



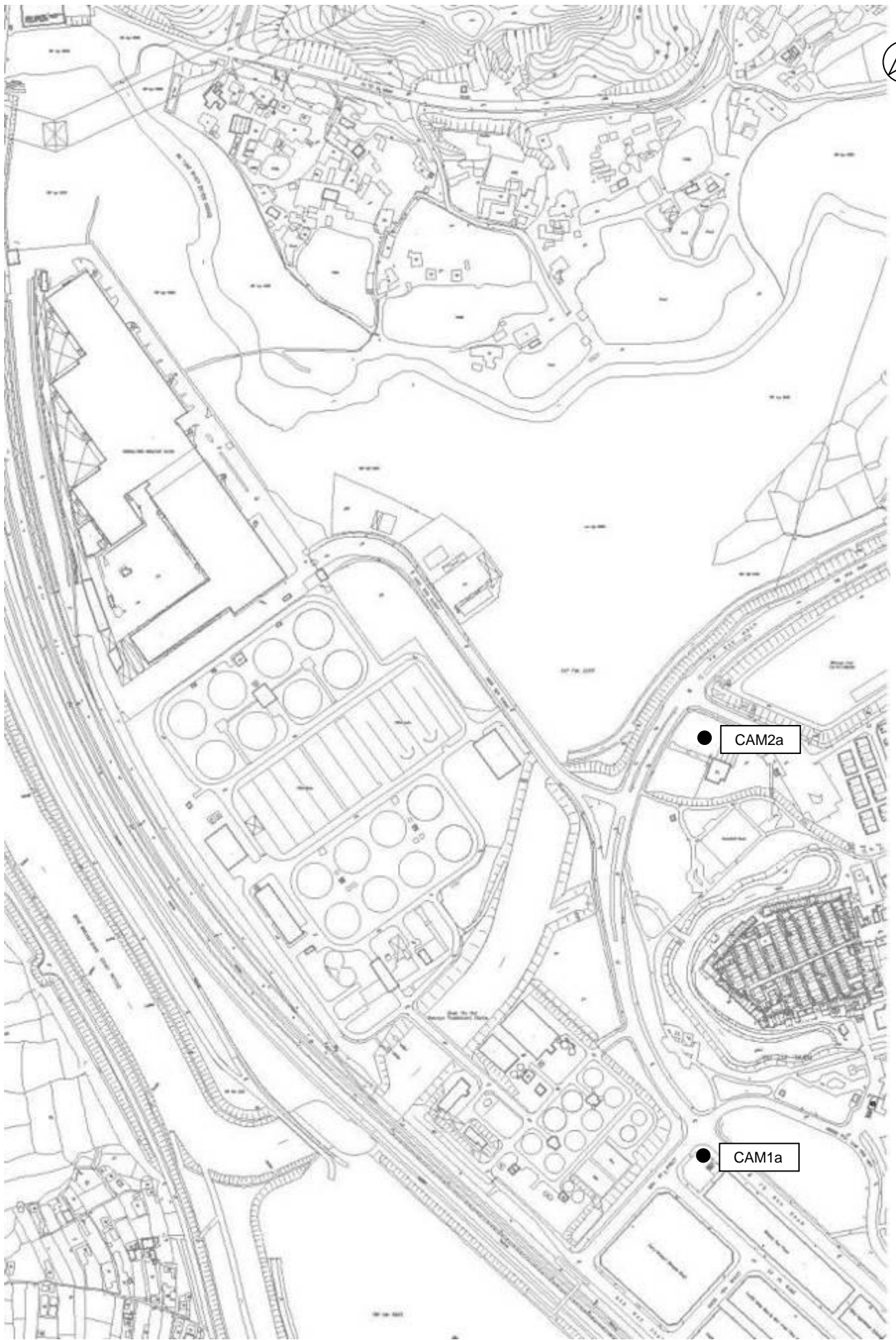
Title

**Expansion of Shuk Wu Hui Sewage Treatment Works**

**Sensitive Receivers**

Appendix 2-b





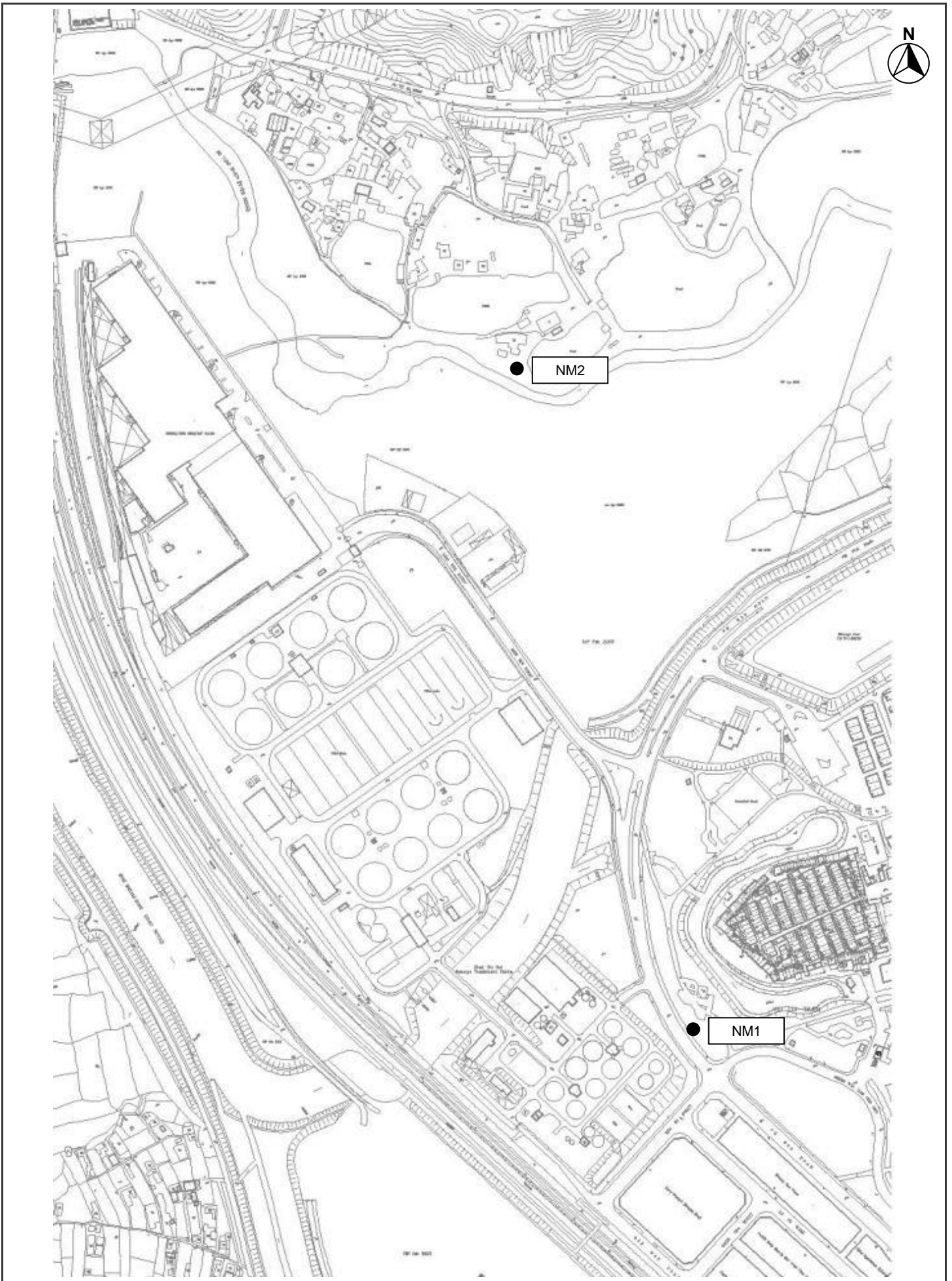
Title



**Expansion of Shuk Wu Hui Sewage Treatment Works**

**Location of Air Quality Monitoring Station**

Appendix 2-c





		<p>Title</p> <p><b>Expansion of Shuk Wu Hui Sewage Treatment Works</b></p> <p><b>Location of Noise Monitoring Station</b></p>	<p>Appendix 2-d</p>
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Appendix 3

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Environmental Requirements and Implementation  
Status

## IMPLEMENTATIONS STATUS OF MITIGATION MEASURES

### Implementation Status for Air Quality Control

PP Ref#	Environmental Protection Measures	Location / Timing	Implementation Agent	Implementation Status	Follow-up Action and Final Outcome
Annex I S1.7.1	<p>Dust mitigation measures stipulated in the <i>Air Pollution Control (construction Dust)</i> Regulation shall be incorporated to control dust emission from the Site. Notice shall be given to the authority prior to commencement of works.</p> <ul style="list-style-type: none"> <li>• Skip hoist for material transport should be totally enclosed by impervious sheeting;</li> <li>• Vehicle washing facilities should be provided as far as possible at every construction vehicle exit point;</li> <li>• The area where vehicle washing takes place and the section of the road between the washing facilities and the exist point should be paved with concrete, bituminous materials or hardcore;</li> <li>• Where a site boundary adjoins a road, street or other area accessible to the public, hoarding of not less than 2.4m high from ground level should be provided along the entire length except for a site entrance or exit;</li> <li>• Every main haul road should be paved with concrete and kept clear of dusty materials or sprayed with water so as to maintain the entire road surface wet;</li> <li>• The portion of road leading only to a construction site that is within 30m of a designated vehicle entrance or exit should be kept clear of dusty materials;</li> <li>• Every stock of more than 20 bags of cement should be covered entirely by impervious sheeting placed in an area sheltered on the top and the 3 sides;</li> <li>• All dusty material should be sprayed with water prior to any loading, unloading or transfer operation so as to maintain the dusty materials wet;</li> <li>• Every vehicle should be washed to remove any dusty materials from its body and wheels before leaving the construction sites; and</li> <li>• The load of dusty materials carried by vehicles leaving a construction site should be covered entirely by clean impervious sheeting to ensure dusty materials do not leak from the vehicle</li> </ul>	Works sites / during construction period	Contractor	Properly implemented as appropriate	✓

# The section number in the Project Profile for Expansion of Shek Wu Hui Sewage Treatment works (Application No. DIR-121/2005)

## Implementation Status for Water Quality Control

PP Ref#	Environmental Protection Measures	Location / Timing	Implementation Agent	Implementation Status	Follow-up Action and Final Outcome
Annex 2 S2.4.4	The practice outlined in Practice Note for Professional Persons on Construction Site Drainage, Professional Person Environmental Protection Department, 1994 (ProPECC PN 1/94) including the use of sediment traps, wheel washing facilities for vehicles leaving the site, adequate maintenance of drainage systems to prevent flooding and overflow, sewage collection and treatment, and comprehensive waste management (collection, handling, transportation, disposal) procedures should be adopted to minimize the potential water quality impact from construction site runoff and various construction activities.	Works sites / During the construction period	Contractor	Properly implemented as appropriate	✓
Annex 2 S2.4.4	<p><i>Construction Runoff and Drainage</i></p> <ul style="list-style-type: none"> <li>At the start of site establishment, perimeter cut-off drains to direct off-site water around the site should be constructed and internal drainage works and erosion and sedimentation control facilities implemented. Channels, earth bunds or sand bag barriers should be provided on site to direct stormwater to silt removal facilities. The design of the temporary on-site drainage system will be undertaken by the contractor prior to the commencement of construction.</li> <li>The design of efficient silt removal facilities should be based on the guidelines in Appendix A1 of ProPECC PN 1/94, which states that the retention time for silt/sand traps should be 5 minutes under maximum flow conditions. Sizes may vary depending upon the flow rate, but for a flow rate of <math>0.1\text{m}^3\text{s}^{-1}</math> a sedimentation basin of <math>30\text{m}^3</math> would be required and for a flow rate of <math>0.5\text{m}^3\text{s}^{-1}</math> the basin would be <math>150\text{m}^3</math>. The detailed design of the sand/silt traps will be undertaken by the contractor prior to the commencement of construction.</li> <li>Ideally, construction works should be programmed to minimize surface excavation works during the rainy season (April to September). All exposed earth areas should be compacted and vegetated as soon as possible after earthworks have been completed, or alternatively, within 14 days of cessation of earthworks where practicable. If excavation of soil cannot be avoided during the rainy season, or at any time of year when rainstorms are likely, exposed slope surfaces should be covered by tarpaulin or other means.</li> </ul>	Works sites / During the construction period	Contractor	Properly implemented as appropriate	✓

PP Ref#	Environmental Protection Measures	Location / Timing	Implementation Agent	Implementation Status	Follow-up Action and Final Outcome
Annex 2 S2.4.4	<p><i>Construction Runoff and Drainage (Cont'd)</i></p> <ul style="list-style-type: none"> <li>• The overall slope of the site should be kept to a minimum to reduce the erosive potential of surface water flows, and all trafficked areas and access roads protected by coarse stone ballast. An additional advantage accruing from the use of crushed stone is the positive traction gained during prolonged periods of inclement weather and the reduction of surface sheet flows.</li> <li>• All drainage facilities and erosion and sediment control structures should be regularly inspected and maintained to ensure proper and efficient operation at all times and particularly following rainstorms. Deposited silt and grit should be removed regularly and disposed of by spreading evenly over stable, vegetated areas.</li> <li>• Measures should be taken to minimize the ingress of site drainage into excavations. If the excavation of trenches in wet periods is necessary, they should be dug and backfilled in short sections wherever practicable. Water pumped out from trenches or foundation excavations should be discharged into storm drains via silt removal facilities.</li> <li>• Open stockpiles of construction materials (for example, aggregates, sand and fill material) of more than 50m<sup>3</sup> should be covered with tarpaulin or similar fabric during rainstorms. Measures should be taken to prevent the washing away of construction materials, soil, silt or debris into any drainage system.</li> <li>• Manholes (including newly constructed ones) should always be adequately covered and temporarily sealed so as to prevent silt, construction materials or debris being washed into the drainage system and storm runoff being directed into foul sewers.</li> <li>• Precautions to be taken at any time of year when rainstorms are likely, actions to be taken when a rainstorm is imminent or forecasted, and actions to be taken during or after rainstorms are summarized in Appendix A2 of ProPECC PN 1/94. Particular attention should be paid to the control of silty surface runoff during storms events, especially for areas located near steep slopes.</li> </ul>	Works sites / During the construction period	Contractor	Properly implemented as appropriate	✓

PP Ref#	Environmental Protection Measures	Location / Timing	Implementation Agent	Implementation Status	Follow-up Action and Final Outcome
Annex 2 S2.4.4	<p><i>Construction Runoff and Drainage</i></p> <ul style="list-style-type: none"> <li>All vehicles and plant should be cleaned before leaving a construction site to ensure no earth, mud, debris and the like is deposited by them on roads. An adequately designed and sited wheel washing bay should be provided at every site exits and wash-water should have sand and silt settled out and removed at least on a weekly basis to ensure the continued efficiency of the process. The section of access road leading to, and exiting from, the wheel-wash bay to the public road should be paved with sufficient backfill toward the wheel-wash bay to prevent vehicle tracking of soil and silty water to public roads and drains.</li> <li>On-site drainage system should be equipped with oil interceptors to separate oil/fuel from contaminated storm water.</li> </ul>	Works site / During the construction period	Contractor	Properly implemented as appropriate	✓
Annex 2 S2.4.4	<p><i>General Construction Activities</i></p> <ul style="list-style-type: none"> <li>Construction solid waste, debris and rubbish on site should be collected, handled and disposed of properly to avoid water quality impacts.</li> <li>All fuel tanks and storage areas should be provided with locks and sited on sealed areas, within bunds of a capacity equal to 100% of the storage capacity of the largest tank to prevent spilled fuel oils from reaching water sensitive receivers nearby.</li> </ul>	Works site / During the construction period	Contractor	Properly implemented as appropriate	✓
Annex 2 S2.4.4	<p><i>Sewage from Construction Workforce</i></p> <ul style="list-style-type: none"> <li>Sewage from construction workforce should be handled by portable chemical toilets or sewage holding tanks with the sewage regularly collected by a reputable sewage collector for disposal at, for example, SWHSTW. Sewage from on-site toilets should be diverted to and stored within sewage holding tanks for later disposal.</li> </ul>	Works site / During the construction period	Contractor	Properly implemented as appropriate	✓

# The section number in the Project Profile for Expansion of Shek Wu Hui Sewage Treatment works (Application No. DIR-121/2005)

## Implementation Status for Waste Management

PP Ref#	Environmental Protection Measures	Location / Timing	Implementation Agent	Implementation Status	Follow-up Action and Final Outcome
Annex 3 S3.5.1	<p><i>Waste Reduction Measures of Construction Stage</i></p> <ul style="list-style-type: none"> <li>• Measures recommended in the ETWB TCW No. 15/2003 should be followed to require the contractor to prepare and implement an enhanced Waste Management Plan (WMP) to encourage on-site sorting of C&amp;D materials and to minimize their generation during the course of construction.</li> <li>• For the demolition works, the contractor shall submit a method statement for the works as part of the WMP. The Contractor shall include in the method statement the sequence of demolition and the work programme to facilitate effective recovery of reusable and/or recyclable portions of the C&amp;D materials at the earliest stage, so as to minimise the need for subsequent sorting.</li> <li>• Segregation and storage of different types of waste in different containers, skips or stockpiles to enhance reuse or recycling of materials and their proper disposal.</li> <li>• Separate labelled bins shall be provided to segregate aluminium cans from other general refuse generated by the work force, and to encourage collection of by individual collectors.</li> <li>• Any unused chemicals or those with remaining functional capacity shall be recycled.</li> <li>• Maximising the use of reusable steel formwork to reduce the amount of C&amp;D material.</li> <li>• Prior to disposal of C&amp;D waste, it is recommended that wood, steel and other metals shall be separated for re-use and / or recycling to minimise the quantity of waste to be disposed of to landfill.</li> <li>• Proper storage and site practices to minimise the potential for damage or contamination of construction materials.</li> <li>• Plan and stock construction materials carefully to minimise amount of waste generated and avoid unnecessary generation of waste.</li> <li>• Minimize over ordering of concrete, mortars and cement grout by doing careful check before ordering.</li> </ul>	Work site / During the construction period	Contractor	Properly implemented as appropriate	✓



PP Ref#	Environmental Protection Measures	Location / Timing	Implementation Agent	Implementation Status	Follow-up Action and Final Outcome
Annex 3 S3.5.2 – S3.5.5	<p><i>Good Site Practices</i></p> <ul style="list-style-type: none"> <li>• Nomination of approved personnel, such as a site manager, to be responsible for good site practices, and making arrangements for collection of all wastes generated at the site and effective disposal to an appropriate facility.</li> <li>• Training of site personnel in proper waste management and chemical waste handling procedures;</li> <li>• Provision of sufficient waste disposal points and regular collection for disposal;</li> <li>• Appropriate measures to minimise windblown litter and dust during transportation of waste by either covering trucks or by transporting wastes in enclosed containers;</li> <li>• Regular cleaning and maintenance programme for drainage systems, sumps and oil interceptors;</li> <li>• A Waste Management Plan should be prepared and should be submitted to the engineer for approval; and</li> <li>• A recording system for the amount of wastes generated, recycled and disposed (including the disposal sites) should be proposed.</li> <li>• In order to monitor the disposal of C&amp;D material at landfills and public filling facilities, as appropriate, and to control fly tipping, a trip-ticket system should be included as one of the contractual requirements to be implemented by an Environmental Team undertaking the Environmental Monitoring and Audit work. The measures recommended in ETWB TCW No. 31/2004 should be followed.</li> </ul>	Work site / During the construction period	Contractor	Properly implemented as appropriate	✓
Annex 3 S3.5.6	<p><i>General Refuse</i></p> <ul style="list-style-type: none"> <li>• General refuse should be stored in enclosed bins or compaction units separate from C&amp;D material. A reputable waste collector should be employed by the contractor to remove general refuse from the site, separately from C&amp;D material. An enclosed and covered area is preferred to reduce the occurrence of 'wind blown' light material;</li> </ul>	Work site / During the construction period	Contractor	Properly implemented as appropriate	✓

PP Ref#	Environmental Protection Measures	Location / Timing	Implementation Agent	Implementation Status	Follow-up Action and Final Outcome
Annex 3 S3.5.7	<p><i>Construction and Demolition Material</i></p> <ul style="list-style-type: none"> <li>The C&amp;D material generated from the site formation and demolition works should be sorted on-site into inert C&amp;D material (that is, public fill) and C&amp;D waste. In order to minimise the impact resulting from collection and transportation of C&amp;D material for off-site disposal, the excavated material comprising fill material should be reused on-site as backfilling material as far as practicable. C&amp;D waste, such as wood, plastic, steel and other metals should be reused or recycled and, as a last resort, disposed of to landfill. A suitable area should be designated within the site for temporary stockpiling of C&amp;D material and to facilitate the sorting process.</li> </ul>	Work site / During the construction period	Contractor	Properly implemented as appropriate	✓
Annex 3 S3.5.8	<p><i>Chemical Wastes</i></p> <ul style="list-style-type: none"> <li>When chemical wastes are produced at the construction site, the Contractor would be required to register with the EPD as a Chemical Waste Producer and to follow the requirements stated in the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes. Good quality containers compatible with the chemical wastes should be used. Appropriate labels should be securely attached on each chemical waste container indicating the chemical characteristics of the chemical waste, such as explosives, flammable, oxidizing, irritant, toxic, harmful, corrosive, etc. The Contractor shall use a licensed waste collector to transport and dispose of the chemical wastes in accordance with the Waste Disposal (Chemical Waste) (General) Regulation.</li> </ul>	Work site / During the construction period	Contractor	Properly implemented as appropriate	✓

# The section number in the Project Profile for Expansion of Shek Wu Hui Sewage Treatment works (Application No. DIR-121/2005)

## Implementation Status for Noise Control

PP Ref#	Environmental Protection Measures	Location / Timing	Implementation Agent	Implementation Status	Follow-up Action and Final Outcome
Annex 4 S4.7.1	Use of quiet PME	Work sites / During the construction period	Contractor	Properly implemented as appropriate	✓
Annex 4 S4.7.3	<p><i>Good Site Practice</i></p> <ul style="list-style-type: none"> <li>• Only well-maintained plant should be operated on-site and plant should be serviced regularly during the construction phase;</li> <li>• Silencers or mufflers on construction equipment should be utilised, if found necessary, to further reduce noise, and should be properly maintained during the construction phase;</li> <li>• Mobile plant should be sited as far away from NSRs as possible;</li> <li>• Machines and plant (such as trucks) that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum;</li> <li>• Plant known to emit noise strongly in one direction, should, where possible, be orientated so that the noise is directed away from nearby NSRs; and</li> <li>• Material stockpiles and other structures should be effectively utilised, wherever practicable, in screening noise from on-site construction activities.</li> </ul>	Work sites / During the construction period	Contractor	Properly implemented as appropriate	✓

# The section number in the Project Profile for Expansion of Shek Wu Hui Sewage Treatment works (Application No. DIR-121/2005)

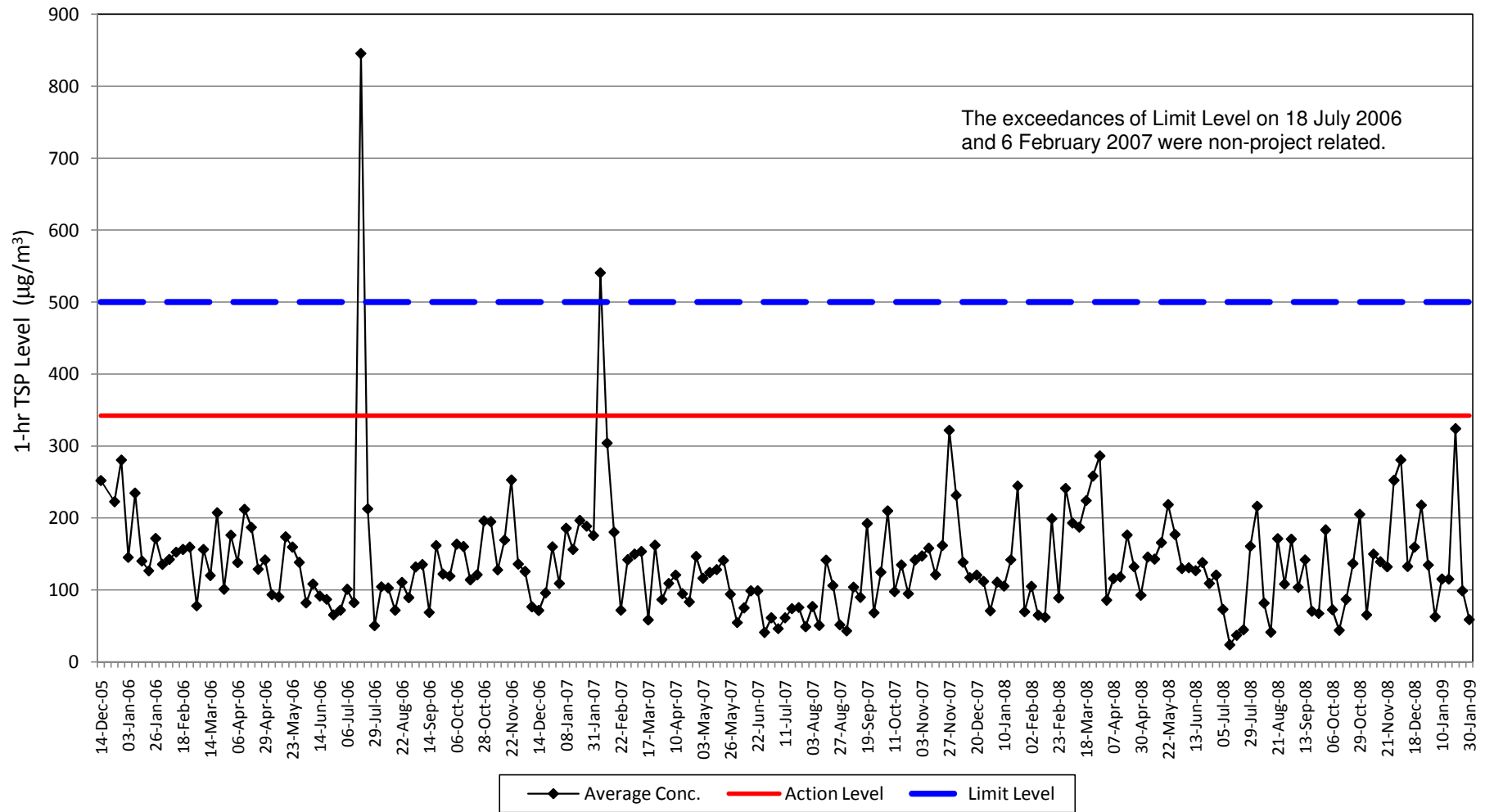
Appendix 4

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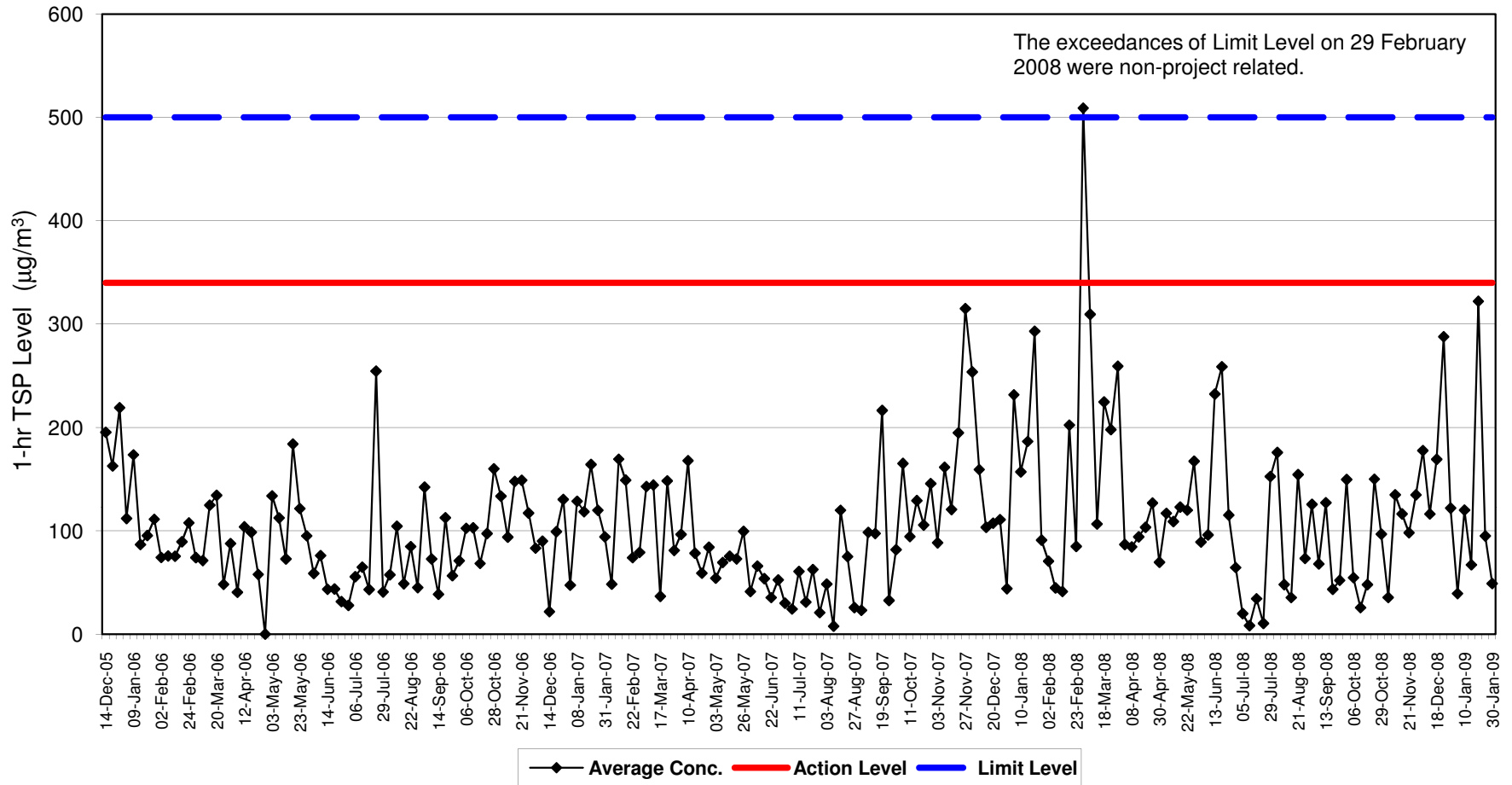
Graphical Presentations of 1-hour and 24-hour TSP  
Monitoring Results

**Shek Wu Hui Sewage Treatment Works at San Po Street Pumping Station  
December 2005 to January 2009  
1-hour TSP Impact Monitoring Result at CAM1a**

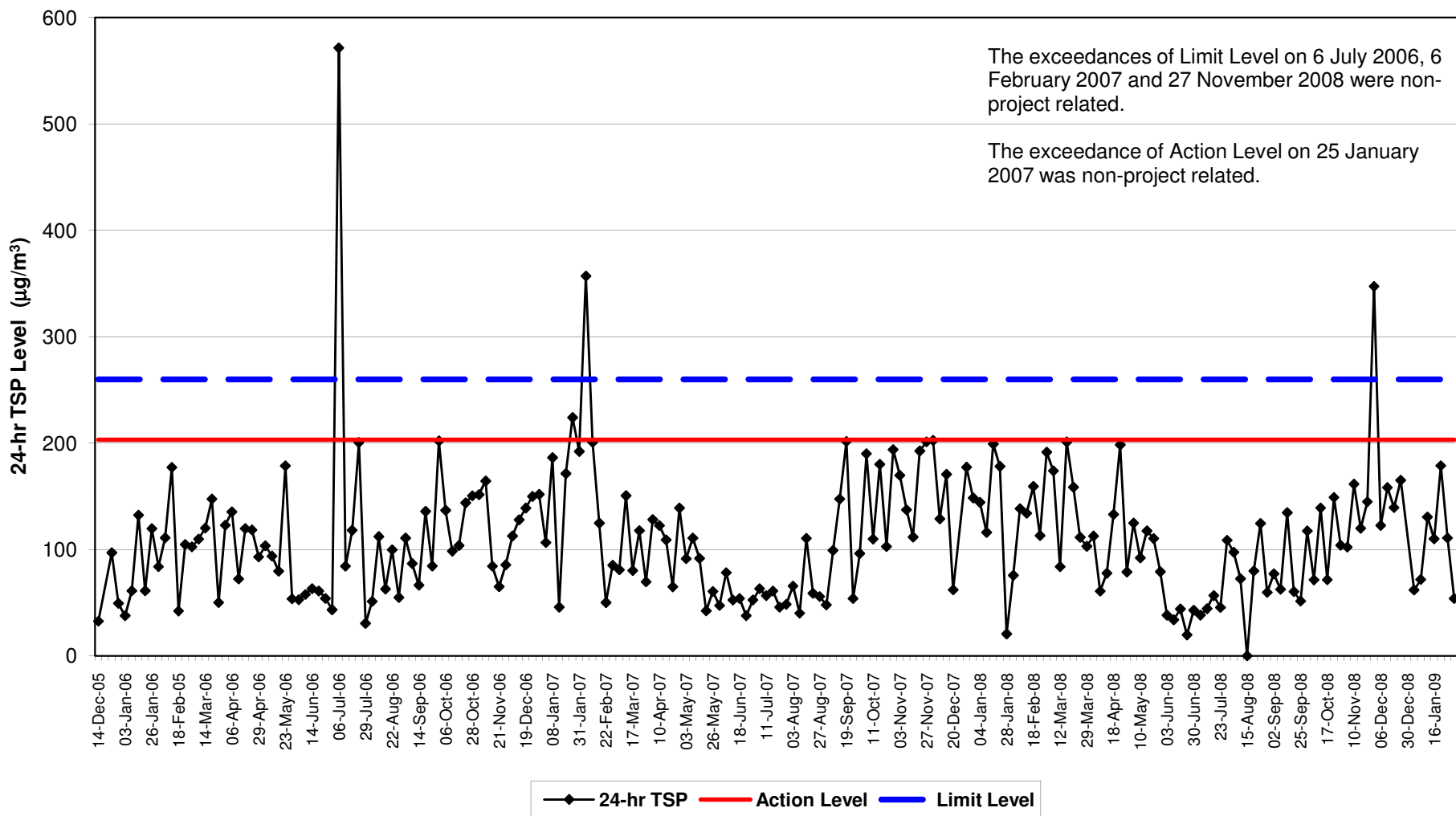
The exceedances of Limit Level on 18 July 2006 and 6 February 2007 were non-project related.



**Shek Wu Hui Sewage Treatment Works at sheung Shui Heung Floodwater Pumping Station (CAM2a)**  
**December 2005 to January 2009**  
**1-hour TSP Impact Monitoring Results at CAM2a**

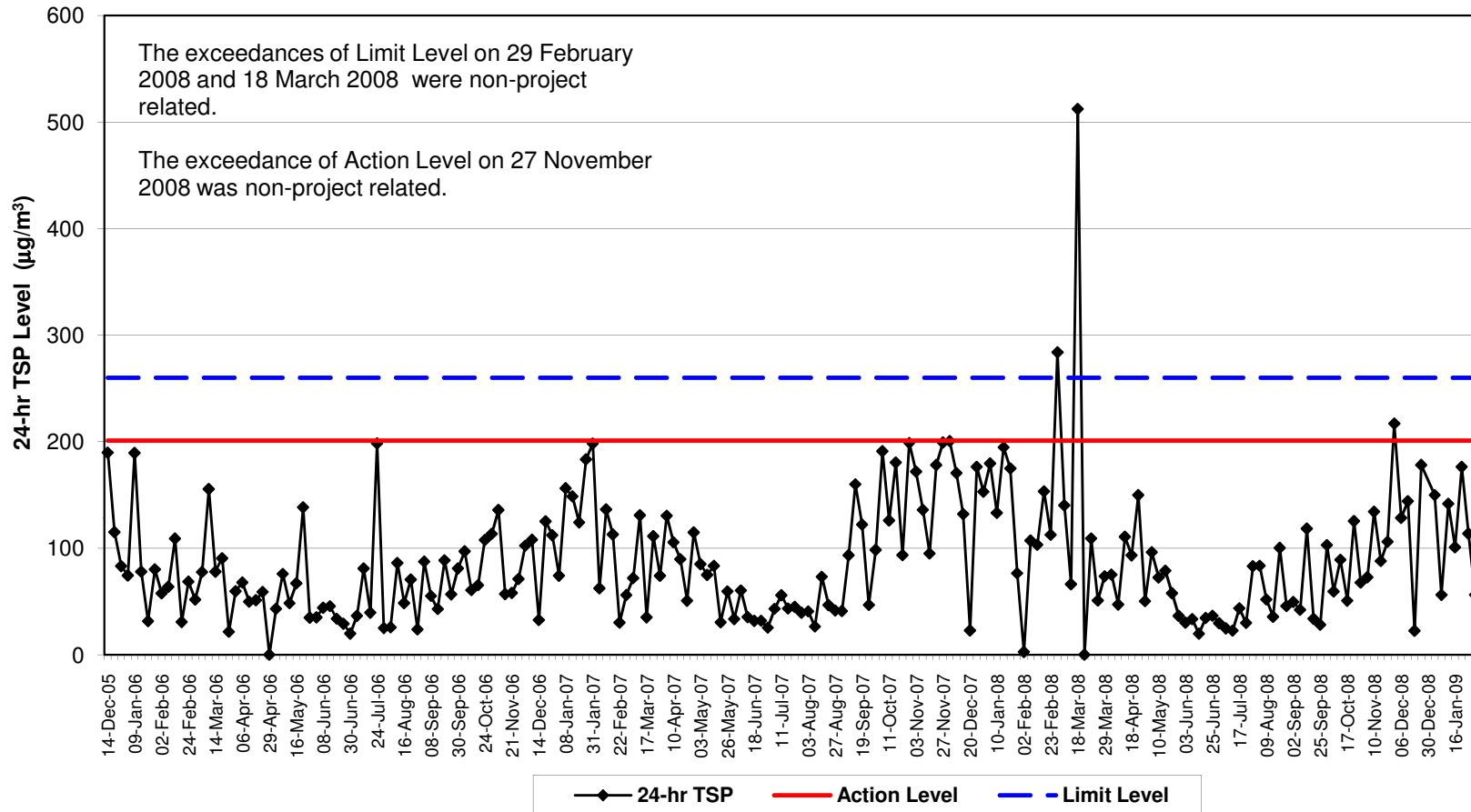


**Shek Wu Hui Sewage Treatment Works at San Po Street Pumping Station (CAM1a)**  
**December 2005 to January 2009**  
**24-hour TSP Impact Monitoring Result at CAM1a**



# Shek Wu Hui Sewage Treatment Works at Sheung Shui Heung Floodwater Pumping Station (CAM2a)

## December 2005 to January 2009 24-hour TSP Impact Monitoring Result at CAM2a



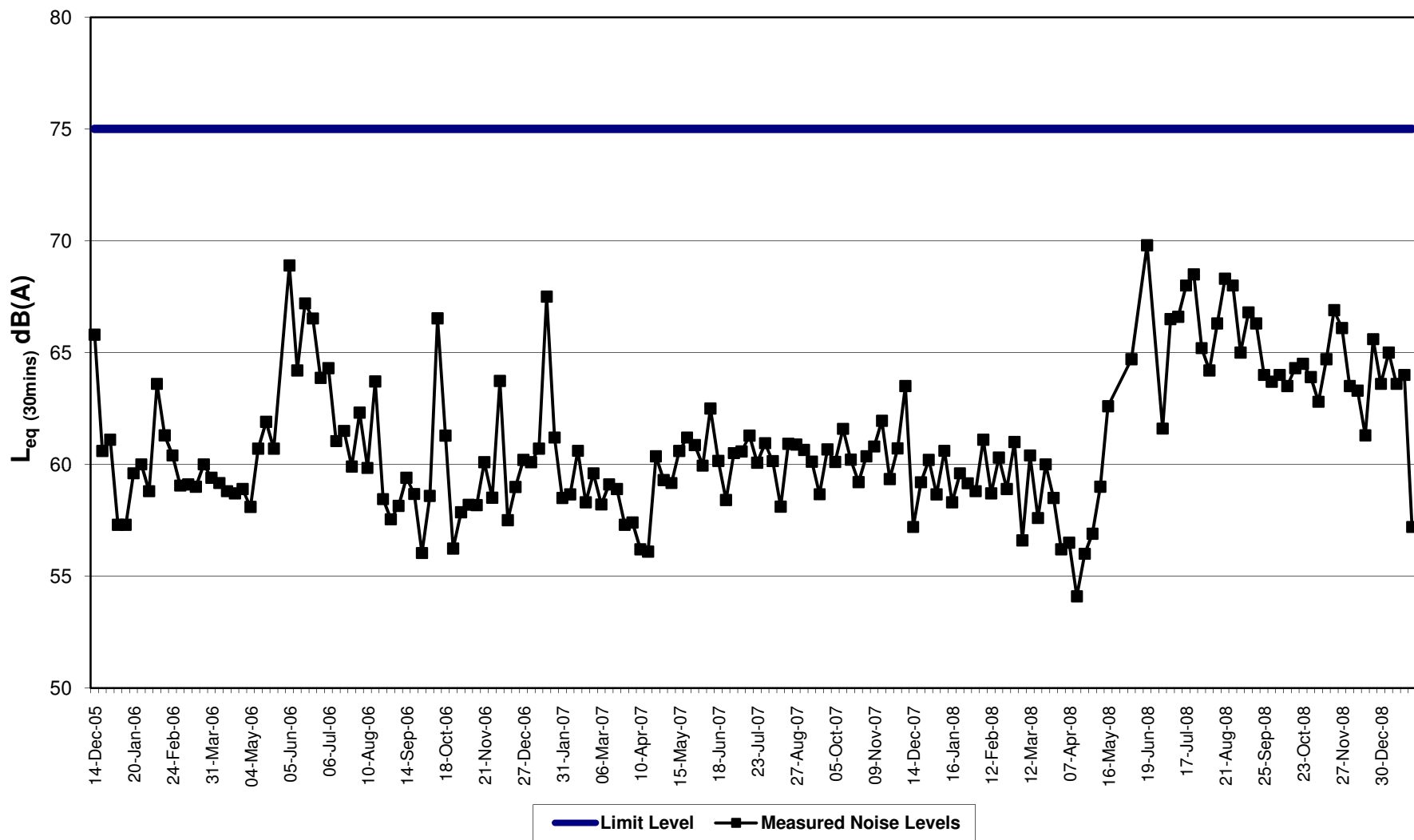


Appendix 5

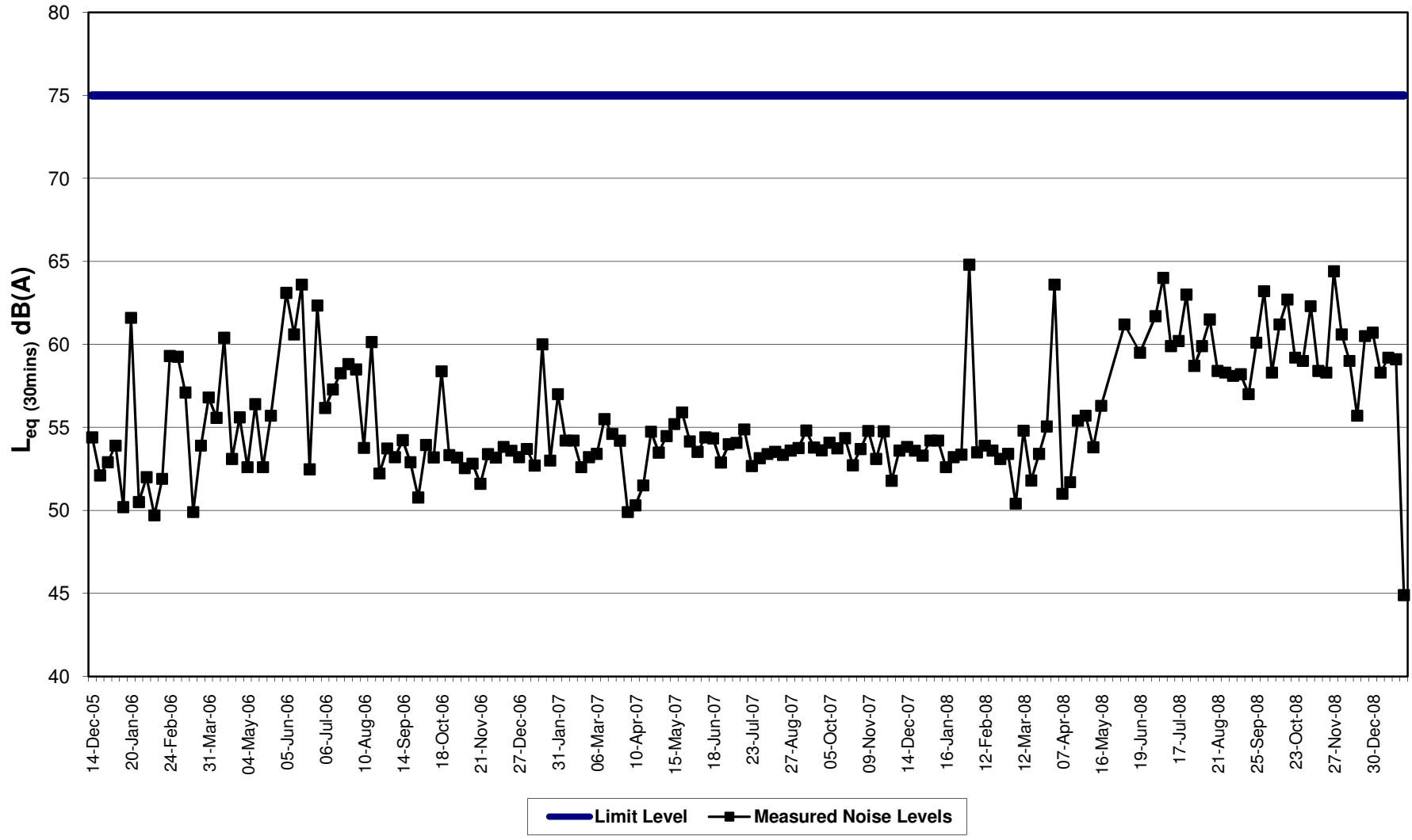
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Graphical Presentations of Noise Monitoring Results

Shek Wu Hui Sewage Treatment Works Noise Impact Monitoring Results at Wai Loi Tsuen (NM1)  
December 2005 to January 2009



### Shek Wu Hui Sewage Treatment Works Noise Impact Monitoring Results at Temporary Domestic Structure (NM2) December 2005 to January 2009



Appendix 6

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Waste Flow Table

**Yearly Summary Waste Flow Table**

Year	Estimated Annual Quantities of Inert C&D Materials (in '000m3)										Estimated Annual Quantities of C&D Wastes									
	Total Quantity Generated*		Broken Concrete		Reused in the Contract		Reused in other Projects		Disposed as Public Fill		Metals		Paper/ cardboard packaging		Plastics		Chemical Waste		Others, e.g. general refuse	
	(a)		(b)		(c)		(d)		(a-b-c-d)		(in '000 kg)		(in '000 kg)		(in '000 kg)		(in '000 kg)		(in '000 m3)	
	Est.	Act.	Est.	Act.	Est.	Act.	Est.	Act.	Est.	Act.	Est.	Act.	Est.	Act.	Est.	Act.	Est.	Act.	Est.	Act.
2004																				
2005	0.600	0.4095	0.600	0.000	0.000	0.000	0.000	0.000	0.000	0.4095	0.000	0.000	0.000	0.1	0.000	0.000	0.000	0.000	0.000	0.4355
2006	20.000	30.9227	0.000	0.000	0.000	0.100	0.000	0.000	20.000	30.8227	2.000	80.894	1.000	0.563	0.100	0.080	0.050	0.02	0.020	0.7787
2007	15.000	11.3655	0.000	0.000	2.000	0.110	0.000	0.000	13.000	11.2555	2.000	626.484	1.000	0.160	0.100	0.000	0.050	0.000	0.020	1.046
2008	0.400		0.000		0.000		0.000		0.400		2.000		1.000		0.100		0.050		0.020	
2009																				
2010																				
Grand Total	36.000	42.6977	0.600	0.000	2.000	0.210	0.000	0.000	33.400	42.4877	6.000	707.3780	3.000	0.823	0.300	0.080	0.150	0.02 kg	0.060	2.2602

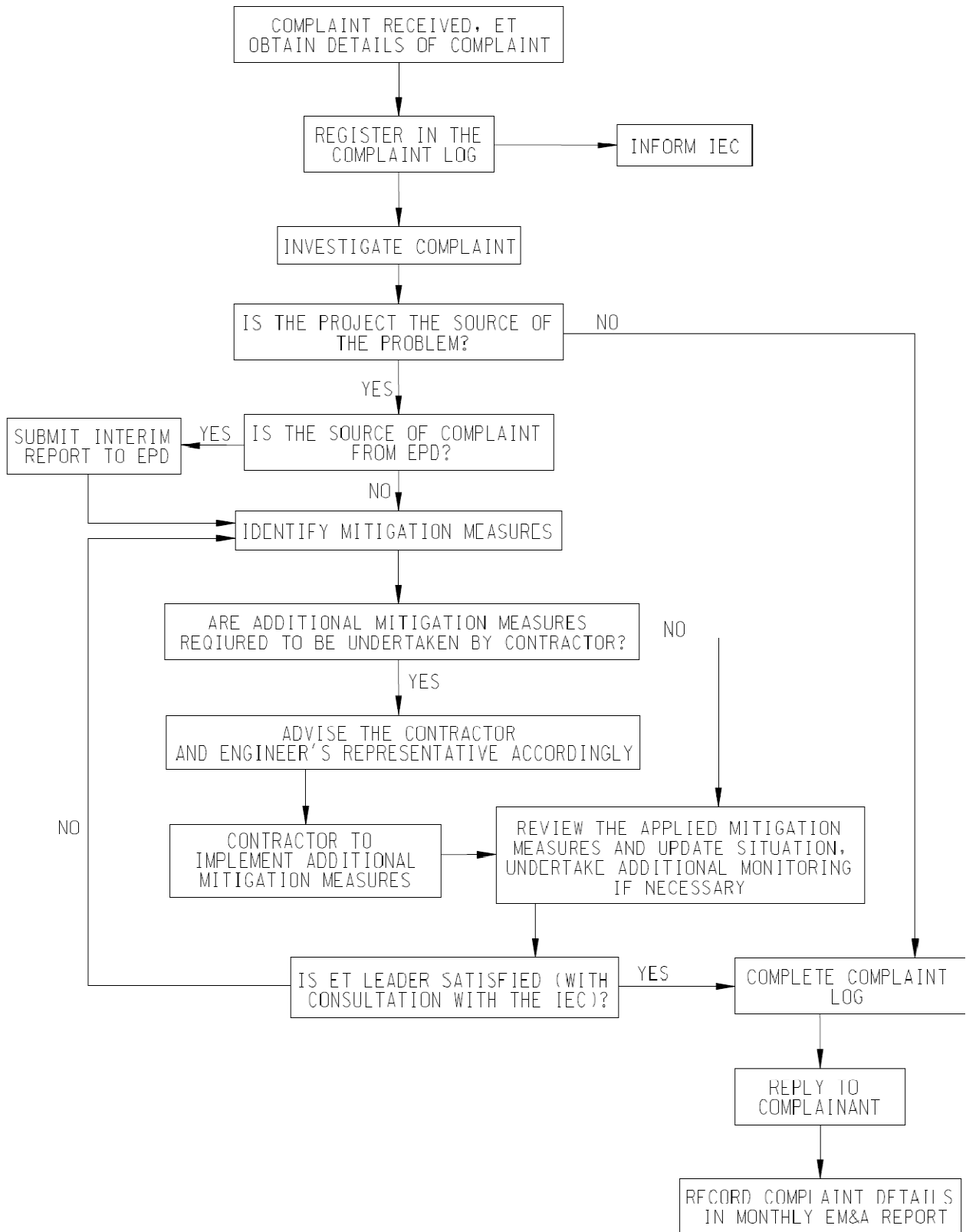
- Notes:
- (1) The performance targets are given in PS Sub-clause 2(5) (c).
  - (2) The waste flow table shall also include C&D materials that are specified in the Contract to be imported for use at the Site.
  - (3) Plastics refer to plastic bottles/containers, plastic sheets / foam from packaging material.
  - (4) Broken concrete for recycling into aggregates.
  - (5) If necessary, use the conversion factor: 1 full load of dumping truck being equivalent to 6.5m<sup>3</sup> by volume.

Appendix 7

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Complaint Flow Table

# Complaint Flow Diagram



Appendix 8

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Complaint Log



Month	Number Received in the reporting month			
	Complaint	Notification of Summons	Successful Prosecution	EPD Site Inspection Record
December 2005	0	0	0	0
January 2006	0	0	0	0
February 2006	0	0	0	0
March 2006	0	0	0	0
April 2006	0	0	0	0
May 2006	0	0	0	0
June 2006	0	0	0	0
July 2006	0	0	0	0
August 2006	0	0	0	0
September 2006	0	0	0	0
October 2006	0	0	0	0
November 2006	0	0	0	0
December 2006	0	0	0	0
January 2007	0	0	0	0
February 2007	0	0	0	0
March 2007	0	0	0	0
April 2007	0	0	0	0
May 2007	0	0	0	0
June 2007	0	0	0	0
July 2007	0	0	0	0
August 2007	0	0	0	0
September 2007	0	0	0	0
October 2007	0	0	0	0
November 2007	0	0	0	0
December 2007	0	0	0	0
January 2008	0	0	0	0
February 2008	0	0	0	1
March 2008	0	0	0	0
April 2008	0	0	0	0
May 2008	0	0	0	0
June 2008	0	0	0	0
July 2008	0	0	0	0
August 2008	0	0	0	0
September 2008	0	0	0	0

October 2008	0	0	0	0
November 2008	0	0	0	0
December 2008	0	0	0	0
January 2009	0	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>